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'ALASIL' TABLETS—the improved form of salicylate medication—provide the efficient analgesia expected from their content of aspirin. Their superior acceptability derives from their content of a reliable buffer which minimizes the tendency to gastric irritation sometimes caused by the use of aspirin alone.

Advantages
'Alasil' is an advanced sedative and antipyretic; it does not tend to induce gastric irritation; because of its high tolerability, it may be used for long-term administration even to those with sensitive stomachs, and to children.

Composition
'Alasil' Tablets contain the recognized antacid corrective, 'Alocol' (Colloidal Aluminium Hydroxide), which permits their sedative principle, acetylsalicylic acid, to exert its action with minimal risk of side-effects.

Indications
Symptomatic pain generally; rheumatism, fibrositis, lumbago, headache, dysmenorrhoea; dental pain.

Packs & Prices
TO PHARMACISTS (*P.T. exempt for dispensing*)
Standard size: 1000 in 250 bottles, 30/8.
'Juvenile' size: 375, 6/6; 750, 11/3; 1500, 21/6.

ALASIL JUVENILE TABLETS
Alasil 'Juvenile' Tablets specially sized for children, and neither coloured nor flavoured, are packed in tubes bearing dosage-for-age instructions.

Alasil

M.391

SAMPLE & LITERATURE ON REQUEST TO A. WANDER LTD., 42 UPPER GROSVENOR ST., LONDON W.1.

For home massage and relief of pain and muscle spasm

Algesal is unique in containing *no counter-irritant*. It is suitable for repeated application by the patient at home, since it will not irritate or redden the skin.

The single, active ingredient is a non-irritating, skin-penetrating salicylate, carried in a soothing white vanishing cream with a pleasant smell of lavender.

INDICATIONS: Fibrositis or muscular rheumatism, osteoarthritis, backache due to lumbo-sacral strain, tenosynovitis, frozen shoulder and local tissue pain after injury or exercise.

Algesal balm gives symptomatic relief in backache due to lumbo-sacral strain

Algesal

non-irritating, skin-penetrating anti-rheumatic salicylate balm

10% *Diethylamine Salicylate, in a soothing vanishing cream.*

Samples and full descriptive literature will be sent on request to the manufacturers

E.G.H. LABS

PERU STREET, SALFORD 3, LANCS.

★ Tear-off pads of leaflets describing a rational home treatment and simple exercises for the relief of backache due to lumbo-sacral strain are available for handing to patients. Other leaflets dealing with osteoarthritis of the knee and frozen shoulder are also available.

Elastoplast

Trade Mark

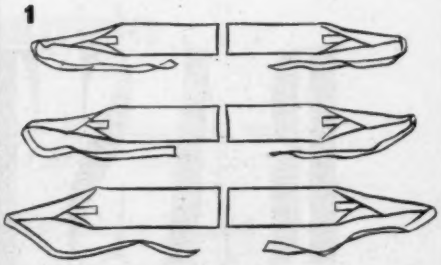
as an alternative to the conventional many-tailed bandage

When frequent dressings are necessary, the following method of applying Elastoplast may be used as a substitute for an abdominal many-tailed bandage.

Six pieces, each about 12 inches in length, are prepared from a 3-inch wide Elastoplast bandage. Tapes are attached as illustrated (Fig. 1), and the completed pieces applied to the body from each side (Fig. 2). The tapes are tied over the dressing covering the wound (Fig. 3). The bandage may be applied by one person without disturbing the patient. It is easily made, provides adequate support and will remain firmly in position.

The above method is comfortable in use as the patient does not have to wear perineal stirrups to keep the bandage in place, or to lie on a bandage which may become "rucked-up" — disadvantages associated with the flannelette type of many-tailed bandage.

1



2

3

ELASTOPLAST

Elastic adhesive bandages (Porous) B.P.C.

Available in 2″, 2½″, 3″ and 4″ widths by 3 yards (unstretched). Prescribable on form E.C.10.

Elastoplast

an S&N product

SMITH & NEPHEW LTD · WELWYN GARDEN CITY · HERTS

RASTINON

»HOECHST«
TOLBUTAMIDE

An oral treatment for diabetes mellitus

EXTENSIVE CLINICAL TRIALS in many countries have shown that Rastinon »Hoechst« tablets provide effective oral treatment for certain types of diabetes mellitus. The initial selection and stabilization of patients to Rastinon therapy should be carried out under strict medical supervision.

Only certain diabetic patients are suitable for treatment with Rastinon »Hoechst«; Tolbutamide.

Each Rastinon tablet contains 0.5 G. of N-Butyl-N'-toluene-p-sulphonylurea (Tolbutamide). Rastinon »Hoechst« was originated in the research laboratory of Farbwerke Hoechst AG., of Frankfurt, under the laboratory number D.860.

Rastinon is now available on form E.C.10 for those patients *who have been stabilized under strict medical supervision.*

HOECHST PHARMACEUTICALS LIMITED
SLOUGH

Distributed in the United Kingdom by
HORLICKS LIMITED · SLOUGH · BUCKS
from whom further information may be obtained on request

Inability to take aspirin . . .

IT WAS RECENTLY reported (*Brit. med. J.*, 1 : 444, 1957) that of 178 rheumatic patients, 25% could not take plain aspirin in adequate dosage.

Of this 25%, however, the great majority tolerated a modified aspirin such as Paynocil.

Not only are Paynocil tablets usually well tolerated by the stomach (even on the heavy dosage needed for rheumatoid arthritis), but they are extremely palatable, disintegrate instantly on the tongue without water, and cause no discomfort or unpleasant after-sensation.

. . . indicates PAYNOCIL

non-irritant, palatable, quick-dispersing aspirin

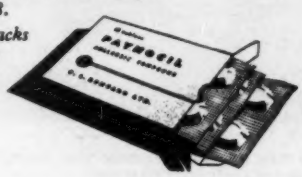
FOR ADULTS

PAYNOCIL

EACH TABLET CONTAINS

Acetylsalicylic acid ..... 10 grains
Aminoacetic acid..... 5 grains

PACKAGES in sealed foil strips:
Cartons of 18.
Dispensing packs of 240: basic N.H.S. cost (tax free) 21/8d.



FOR CHILDREN

Junior PAYNOCIL

EACH TABLET CONTAINS

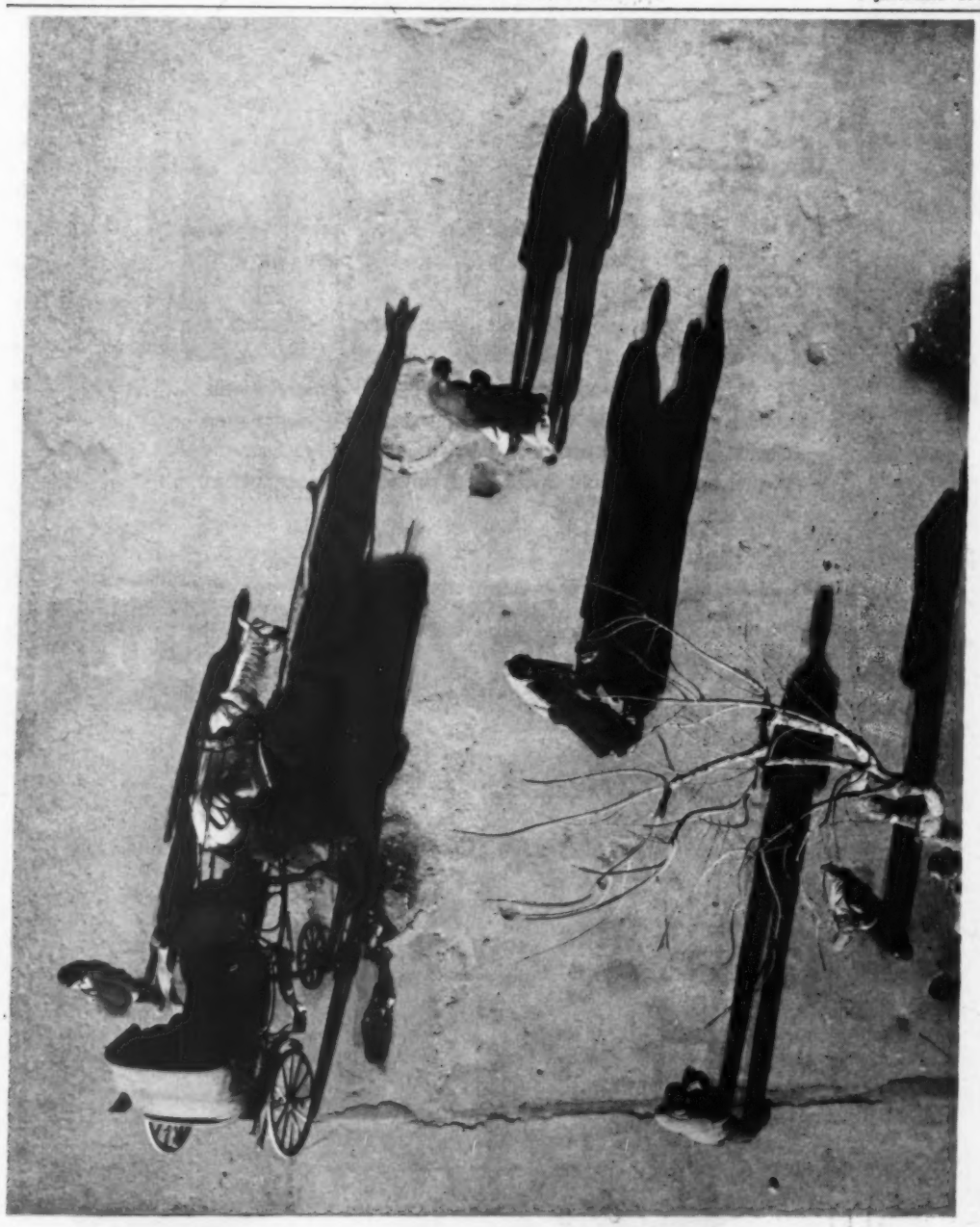
Acetylsalicylic acid ..... 2½ grains
Aminoacetic acid ..... 1½ grains

PACKAGES in sealed foil strips:
Cartons of 20.
Dispensing packs of 240: basic N.H.S. cost (tax free) 12/-.

Detailed recommendations for dosage in rheumatoid arthritis will be gladly supplied on request

C. L. BENCARD LTD. PARK ROYAL, LONDON, N.W.10

601/65 (68)/1



Like shadows dappled on a sunlit street, the pictures which many people have of their lives may be distorted and flattened out of all recognition. Often the viewpoint of these tense, anxious patients is determined by factors beyond your control, for you cannot always remove the cause of their anxieties nor directly solve their problems.

By prescribing Equanil, however, you can provide them with safe, selective sedation which allows such souls to view their lives in true perspective, freed from the flickering fancies of their imaginations.

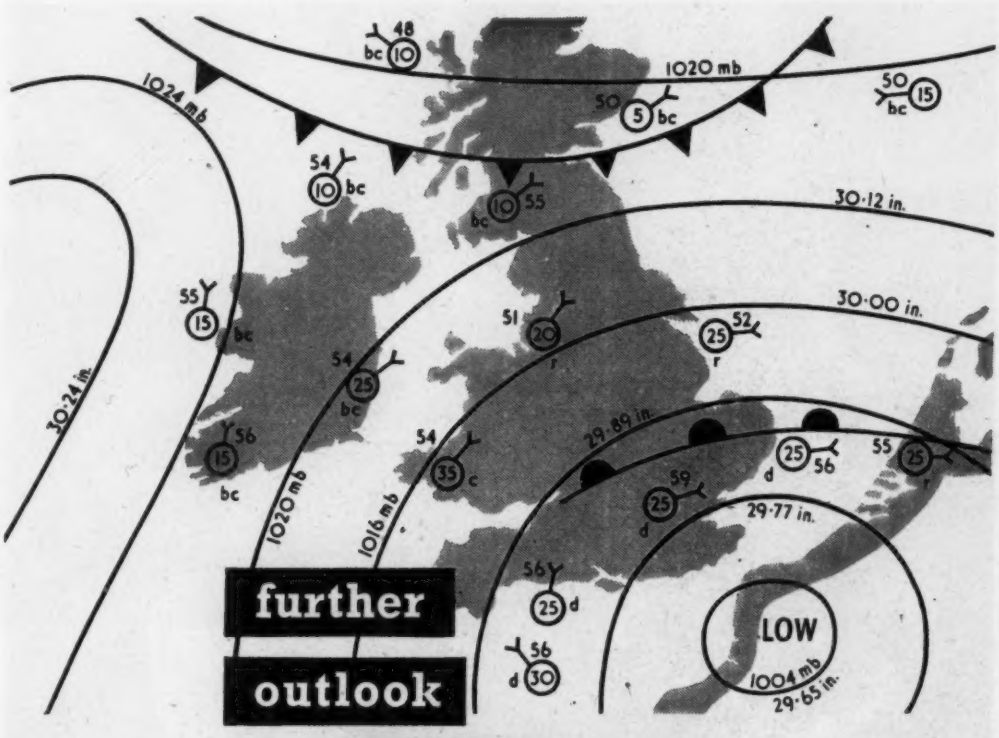
PACKS: *Bottles of 20 and 250.*
Tablets of 400 mg. and 200 mg. (Half-strength)

EQUANIL trade mark MEPROBAMATE

THE SAFE, SELECTIVE SEDATIVE

Wyeth JOHN WYETH AND BROTHER LIMITED, CLIFTON HOUSE, EUSTON ROAD, LONDON, N.W.1

Eql.6



For the inveterate victims of winter ills, the further outlook is indeed unsettled. Yet the prospects for such individuals need not be gloomy—provided steps are taken *now* to maintain their nutritional status at a really satisfactory level. It was for precisely this purpose that VI-MAGNA Multivitamins was formulated. The special merits of VI-MAGNA can be simply defined—a comprehensive formula . . . at an outstandingly high concentration, and only one capsule or teaspoonful of syrup daily.

Vi-Magna*

MULTIVITAMINS

*REGD. TRADE MARK

Each capsule contains:	
Vitamin A	5,000 I.U.
Vitamin D (viosterol)	500 I.U.
Thiamine mononitrate	3 mg.
Riboflavine (B_2)	3 mg.
Pyridoxine HCl (B_6)	0.2 mg.
Ascorbic acid (C)	75 mg.
Niacinamide	20 mg.
Calcium pantothenate	1 mg.
Folic acid	1 mg.
Vitamin B_{12}	1 mcgm.
(as present in concentrated extractives from streptomyces fermentation)	
Bottles of 100 and 1,000	

Each teaspoonful (5 cc.) contains:	
Vitamin A (palmitate)	5,000 I.U.
Vitamin D	500 I.U.
Thiamine HCl (B_1)	3 mg.
Riboflavine (B_2)	2 mg.
Niacinamide	20 mg.
Ascorbic acid (C)	75 mg.
Calcium pantothenate	1 mg.
Pyridoxine HCl (B_6)	0.2 mg.
Vitamin B_{12}	5 mcgm.
(as present in concentrated extractives from streptomyces fermentation)	
Bottles of 4 and 16 fl. ozs.	

Lederle

LEDERLE LABORATORIES DIVISION

Cyanamid OF GREAT BRITAIN LTD., London, W.C.2

A new approach to the treatment of Rheumatoid Disease

RECENT WORK has shown that chloroquine administered in small daily doses (1-2 tablets 'Avloclor') can produce good to excellent results in the control of rheumatoid disease, particularly rheumatoid arthritis. The treatment is safe and free from serious side-effects. Moreover, unlike the steroids, it has the advantage that it can be given over a prolonged period without influencing the adrenal, the pituitary, or any other internal function.

'Avloclor' *Chloroquine Phosphate B.P.*

Issued in bisected tablets of 0.25 gramme
(equivalent to 0.15 gramme base)

Literature and further information available on request

IMPERIAL CHEMICAL INDUSTRIES LIMITED Pharmaceuticals Division Wilmslow Cheshire

ICI

Ph.791

Relief for the asthmatic child

UNIQUE BUFFERED THEOPHYLLINE SYRUP

Relief from the apprehension and acute distress of an asthmatic attack is provided by 'ENGLATE.' In almost all cases gastrointestinal disturbance is entirely absent. The combination of theophylline sodium with glycine permits full and effective therapeutic activity and by reducing gastric precipitation of theophylline enables larger doses to be prescribed.

ENGLATE

Regd. Trade Mark — *Theophylline Sodium Glycinate*

SYRUP (containing 120 mgms. of theophylline sodium glycinate per 4 mils.) for children up to 12 years. Available in bottles of 8 fluid ounces.

TABLETS (300 mgms. of theophylline sodium glycinate). Available in bottles of 50 and 500.

Samples and literature will gladly be sent on request

A Nicholas Product

A. & G. Nicholas LTD.

Ethical Pharmaceuticals

SLOUGH ENGLAND

13

PARKE-DAVIS
now have available

ASIAN INFLUENZA VACCINE

for general prescription

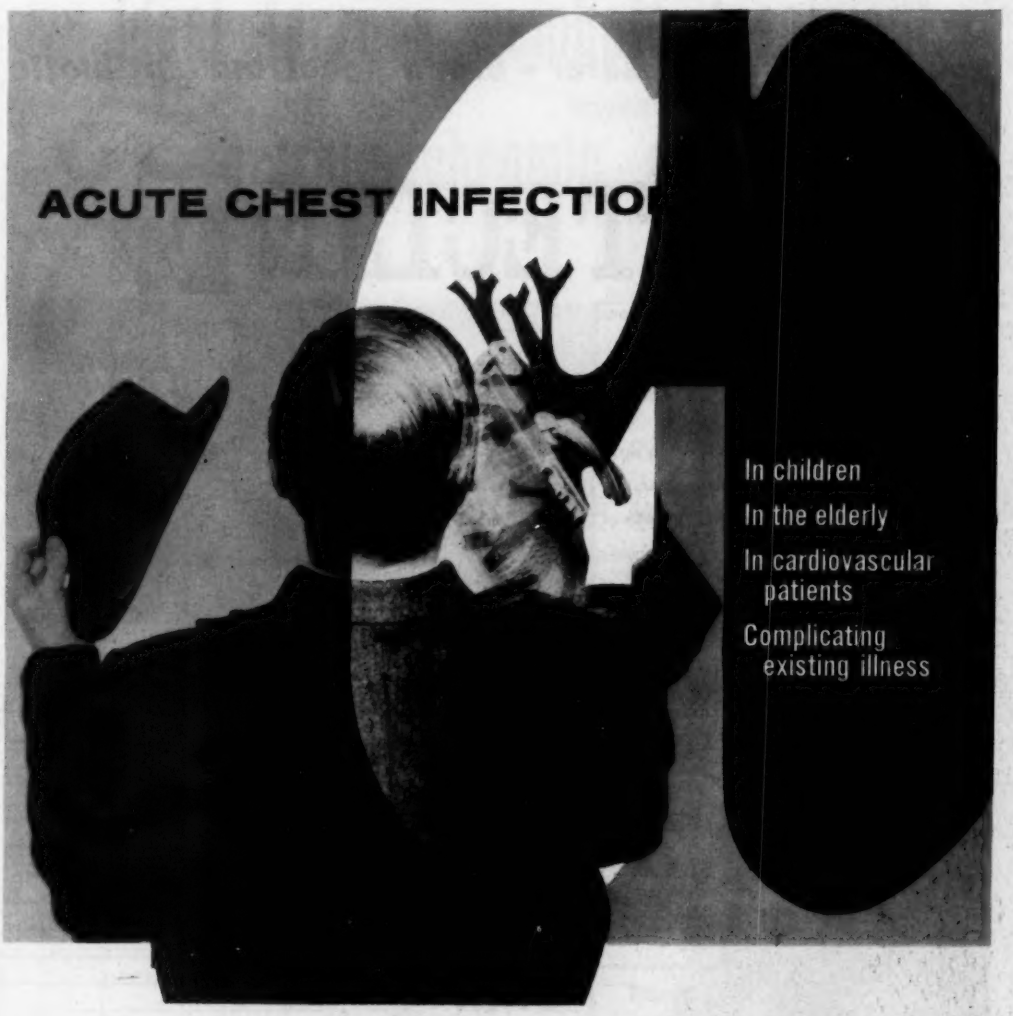
This material is the original vaccine developed in the Wright-Fleming Institute of Microbiology, using Influenza Virus A/Singapore/1/57, as supplied to Ministry of Health requirements.

available in ampoules of 1 c.c. and vials of 10 c.c.

Influenza Virus A (Asian) Vaccine is prepared in the Wright-Fleming Institute of Microbiology, St. Mary's Hospital Medical School, London, W.2.

Sole Distributors:
PARKE, DAVIS & Company Ltd. *(Inc. U.S.A.),*
Hounslow, Middlesex. *Tel: Hounslow 2361.*

930



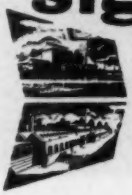
Patients in these four groups of cases are especially prone to develop fulminating—and possibly fatal—infections. In treating such people the niceties of diagnosis and treatment —laboratory tests and the successive use of various antibiotics—must often give place to *immediate* and *empirical* chemotherapy. The antibiotic needed is that which is most likely to establish control completely, quickly, and with the lowest risk of side effects.

URGENT INDICATIONS FOR

sigmamycin*

OLEANDOMYCIN TETRACYCLINE

CERTAINTY OF CONTROL
SPEED OF ACTION
SAFETY



Pfizer Pharmaceuticals

Manufactured at Sandwich and processed at Folkestone, Kent.

* Registered Trade Mark

041/P

now available the safer – broad spectrum antibiotic

MYSTECLIN V

Squibb tetracycline hydrochloride and nystatin with added sodium metaphosphate

faster, higher initial tetracycline blood levels

NYSTATIN; the specific and safe antifungal antibiotic; provides added protection. Among the patients most likely to be susceptible to overgrowth of Candida albicans are, those requiring high or prolonged antibiotic dosage; debilitated or elderly patients; diabetics; infants, particularly prematures; and women, particularly during pregnancy.

PLUS.. UNIQUE PROTECTION AGAINST MONILIAL OVERGROWTH

Each Mysteclin-V capsule contains 250 mg. tetracycline hydrochloride plus sodium metaphosphate and 250,000 units of Nystatin. Supplied in bottles of 12 and 100 capsules.

E. R. SQUIBB & SONS LTD., 17-18 Old Bond Street, London, W.1.

Ideal ferrous sulphate treatment for hypochromic anaemia

Plesmet TABLETS

EXCEPTIONALLY WELL TOLERATED

RAPID ABSORPTION

MAXIMUM UTILISATION

LOW COST

Plesmet improves on hæmopoietic efficiency of ferrous sulphate in all iron deficiency anæmias by ensuring that it is exraordinarily well tolerated — particularly in pregnancy.

EACH TABLET CONTAINS

Ferrous Amino-acetosulphate equivalent to 50 mgm. of Ferrous Iron with 1 mgm. of Aneurine Hydrochloride B.P.

In a recent clinical trial a a course of Plesmet was markedly successful in raising the hæmoglobin percentage from an initial average level of 62 to 73 in two weeks.

Basic N.H.S. Price :
100 tablets .. 2/8
1,000 tablets .. 17/6

C&C LTD. TRADE MARK

COATES & COOPER LTD.

PYRAMID WORKS • WEST DRAYTON • MIDDLESEX

MAXIMAL EFFICIENCY AT MINIMAL COST- WRITE FOR SAMPLES & LITERATURE

New

DISTAQUAINE V-K

Potassium penicillin V

a chemically improved form of 'DISTAQUAINE' V

* **greater solubility**
* **faster absorption**
* **earlier peak blood levels**
* **higher therapeutic concentration**

DISTAQUAINE V-K

Each tablet contains the equivalent of 125 mg. penicillin V acid (as potassium salt):

Dosage: One or more tablets, depending upon the severity of the infection, at four-hourly intervals.

DCBL

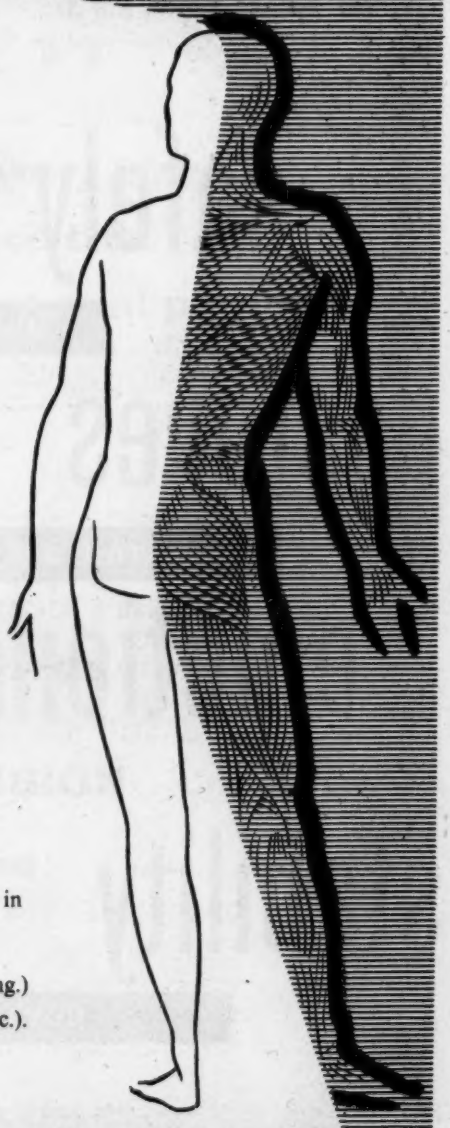
THE DISTILLERS COMPANY (*Biochemicals*) LIMITED

Broadway House, The Broadway, Wimbledon, London S.W.19 Tel: Liberty 6600.

Owners of the trade mark 'DISTAQUAINE'

PPD3/35

Protein Tissue Building without Virilisation



NILEVAR* promptly reverses nitrogen loss, stimulates protein tissue formation without significant androgenic effects and can be given to patients :

irrespective of age or sex
in simple daily doses
for as long as it is therapeutically needed

INDICATIONS :

Problems of protein build-up commonly occur in :

Convalescence from acute illness
Chronic wasting disease
Undernourished or underweight individuals
Recovery after surgery
Preparation for planned surgery
Recovery from severe burns and traumata
Prematurely born infants

In these conditions NILEVAR is the essential treatment in restoring positive nitrogen balance and well-being.

NILEVAR is available in bottles of 25 and 50 tablets (10mg.) and in boxes of 6 ampoules (each containing 25 mg. in 1 c.c.).

Literature available on request

**Nilevar*

brand of norethandrolone

SEARLE HIGH WYCOMBE, BUCKS. Tel: High Wycombe 1770

NV: PI8

Covatin safely restores emotional stability

Covatin in general practice

stabilises the patient's emotional responses, calms his fears, safely and steadily promotes a balanced condition in which re-adjustment to the causes of his anxiety can take place.

outstandingly safe in long-term therapy

- Particularly suitable for the chronically tense, over-active patient
- low toxicity and freedom from side effects
- non hypnotic, even at high dosage levels
- alertness is unimpaired, so the patient can follow his usual everyday activities
- non habit forming
- absence of euphoria
- no interference with appetite

Dosage: 1-2 tablets, 3 times a day with food.
Presentation: 50 mg. sugar coated tablets in bottles of 50 and 500.

Covatin is a new compound

With entirely new chemical and pharmacological properties for the specific treatment of emotional instability.

Covatin
TRADE MARK

WILLIAM R. WARNER & CO. LTD., EASTLEIGH, HAMPSHIRE

Calcipen-V

CALCIUM PENICILLIN-V

proved in performance the most efficient oral penicillin

and now

Calcipen-V

SUSPENSION

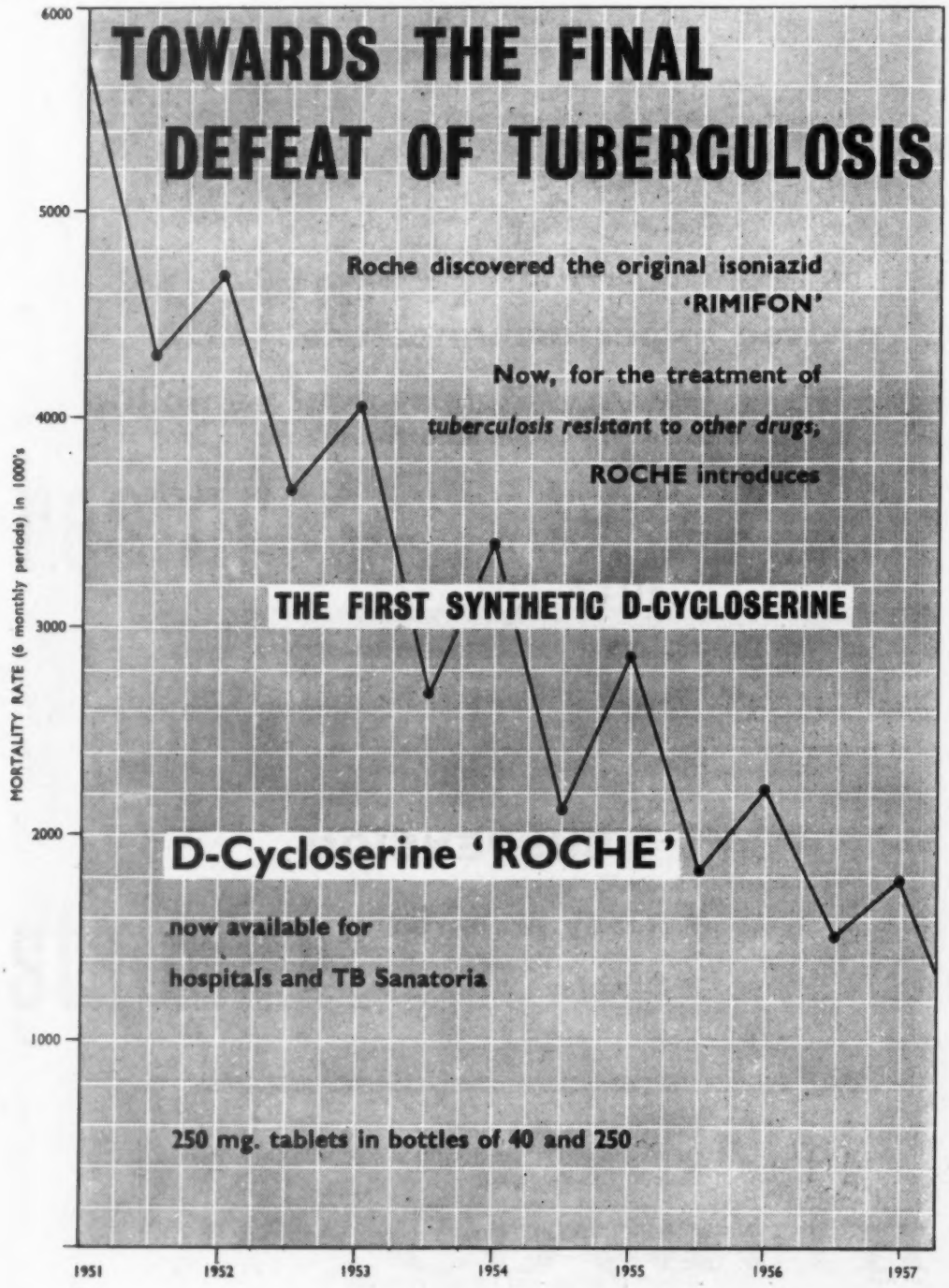
* **Ready prepared**
* **Stable**
* **Palatable**

Contains 60 mg. Penicillin V
(as calcium salt) in 5cc. Bottles of 60cc. with plastic spoon.
Basic N.H.S. Price 5/6d.

Also available—
Tablets of 60 mg. and 120 mg. Penicillin V.

Detailed literature and sample gladly sent on request

BOOTS PURE DRUG COMPANY LIMITED · NOTTINGHAM · ENGLAND



ROCHE PRODUCTS LIMITED · 15 MANCHESTER SQUARE · LONDON W1

'RAUWILOID'

is essential for Hypertension

'Rauwiloid', a purified and standardised fraction of Rauwolfia serpentina alkaloids, can be considered a basic treatment for hypertension. It lowers blood pressure more effectively than phenobarbitone or its combinations with theobromine and is less likely to cause depression than reserpine.

IMPORTANT

'Rauwiloid' may require more than a week for a significant anti-hypertensive effect to develop. Any previous treatment, particularly barbiturate, should be gradually reduced over this period.

In Mild to Moderate Hypertension

In most cases 'Rauwiloid' will provide adequate control by itself. Combination therapy is not necessary.

In Moderate to Severe Hypertension

When a greater hypotensive effect is required, 'Rauwiloid' should be combined with veratrum in the form of 'Rauwiloid + Veriloid'. 'Veriloid' is a biologically standardised alkaloidal extract of Veratrum viride. Such a combination with 'Rauwiloid' enables adequate doses of veratrum to be given for a satisfactory hypotensive response. (See detailed literature).

In Severe or Malignant Hypertension

'Rauwiloid' used in conjunction with ganglionic blocking agents enables a smaller dose of the more potent medicament to be used, thereby minimising side-effects and decreasing the tendency for tolerance to develop.

'Rauwiloid' is available in 2 mg. tablets in bottles of 60 and 500. Dosage, two tablets at night.

RIKER

'Rauwiloid' and 'Veriloid' are registered trade marks

Registered Users

RIKER LABORATORIES LIMITED

LOUGHBOROUGH, LEICS.

MA.4606

SAFETY

IN

NUMBERS

with

'SULPHATRIAD'

trade mark brand

COMPOUND SULPHONAMIDES

There are many infections in which sulphonamide therapy is clearly indicated. The difficulty is that high dosages of a sulphonamide may produce sensitization reactions, crystalluria and other undesirable side-effects.

This is why 'Sulphatriad' is so valuable. Its effective action is the sum of the virtues of its three powerful constituents, and combines rapid absorption with a good tissue distribution. But as the risk of crystalluria is relative to the concentration in the urine of a single sulphonamide, 'Sulphatriad' means reduced concentrations—and reduced risk.

Detailed information is available on request.

MANUFACTURED BY MAY & BAKER LTD

AN M&B brand Medical Product

DISTRIBUTORS: PHARMACEUTICAL SPECIALITIES (MAY & BAKER) LTD · DAGENHAM

Where

every ounce

counts . . .

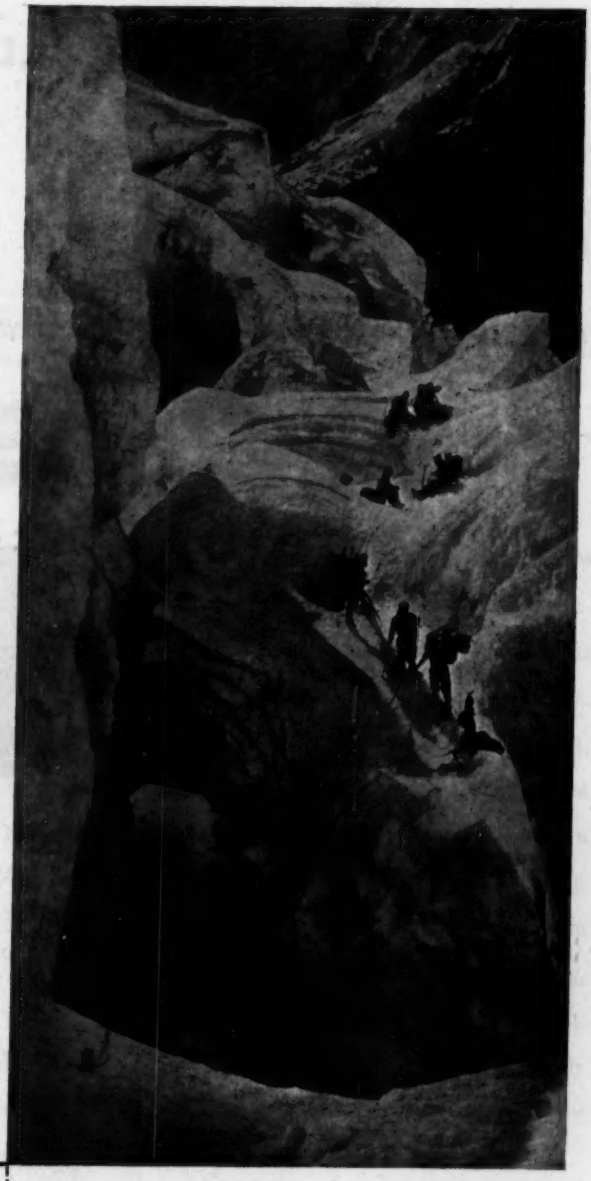
Bellergal tablets were carried to the summit of Everest by the members of the 1956 Swiss Expedition and widely used to counteract the psychosomatic effects of stress at high altitudes.

Bellergal

BY **SANDOZ**

is effective at all levels (central, sympathetic, parasympathetic) in the symptomatic treatment of a wide variety of psychosomatic disorders.

0.1 mg. total alkaloids of belladonna
0.3 mg. Ergotamine Tartrate B.P.
20 mg. Phenobarbitone B.P.



Original Everest Expedition photograph kindly supplied by the Swiss Foundation for Alpine Research

Sandoz Products Limited

Sandoz House

23 Great Castle Street

London, W.1

LIQUID ORAL PENICILLIN–*INSTANTLY*

Straight out of the bottle into the spoon

straight from the spoon

to the patient's mouth

that's Penicillin V Oral Liquid Glaxo! No precious time is wasted mixing it with water . . . for this penicillin V liquid is taken 'neat'. It's ready-prepared; ready for instant use, day or night; stable for two years. The two-ounce bottle contains 16 palatable toffee-flavoured teaspoonfuls.*

PENICILLIN V ORAL LIQUID *Glaxo*

Bottles of 2 fl. oz.

**The 5½ cc. measure provided delivers 62.5 mg. of penicillin V.*

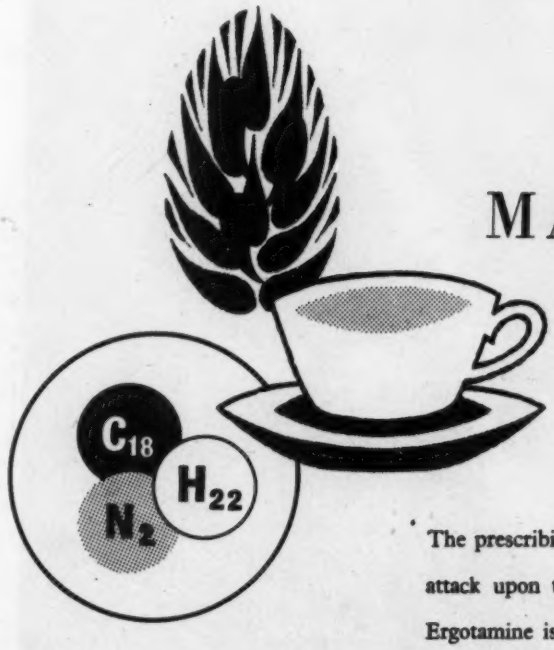
Where cost is a consideration, Penicillin G CRYSTAPEN Tablets may be preferred. The indications are the same, and results are equally good.

CRYSTAPEN TABLETS

Bottles of 12, 100 and 500

GLAXO LABORATORIES LTD., GREENFORD, MIDDLESEX BYRON 3434

Subsidiary Companies or Agents in most countries



today's new MASTER PLAN *against migraine*

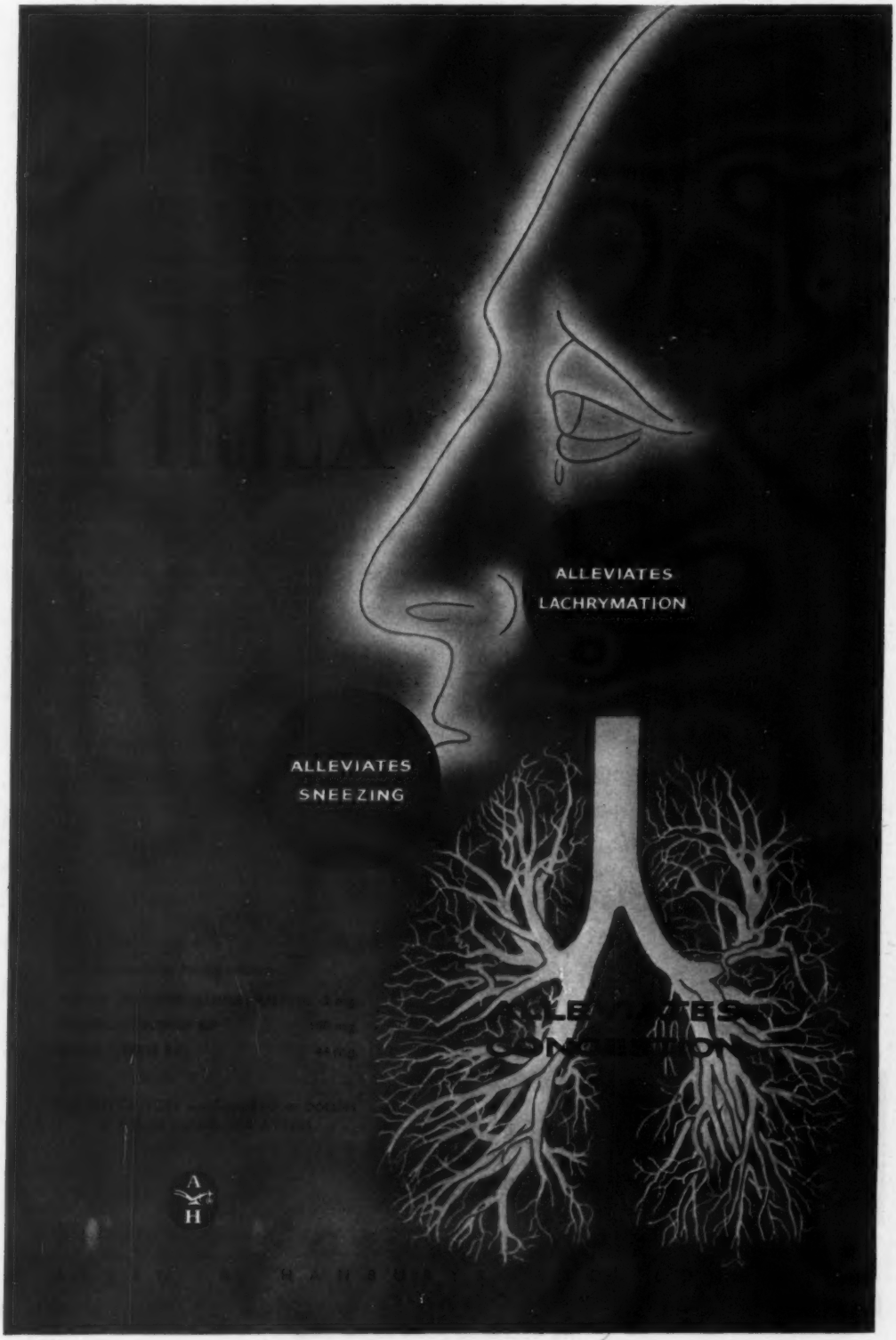
Each tablet contains ergotamine tartrate 2 *mgm.; caffeine (alkaloid)* 100 *mgm.; cyclizine hydrochloride* 50 *mgm.*
In bottles of 10 *and* 100

The prescribing of 'Migril' makes possible at last a *planned* attack upon the three predominant symptoms of migraine. Ergotamine is present at strength in 'Migril' for its specific effect upon the characteristic headache and ocular disturbances. Caffeine is present too, since it acts as a synergist to ergotamine. Frequently, however, ergotamine tends to evoke nausea and vomiting on its own account and can therefore worsen these aspects of the condition. For this reason, the potent, rapidly acting anti-emetic cyclizine is also included in 'Migril'—to overcome any tendency to nausea or vomiting, whether caused by the ergotamine or by the condition itself. And so successfully does cyclizine achieve this aim that truly effective oral doses of ergotamine can today be given—by means of 'Migril'.

'migril' TRADE MARK

BURROUGHS WELLCOME & CO., LONDON
(THE WELLCOME FOUNDATION LTD.)

27


ALLEVIATES
LACHRYMATION
ALLEVIATES
SNEEZING
A
H

REGULATION OF BODY TEMPERATURE IN HEALTH AND DISEASE *

Sir GEORGE PICKERING
M.A., M.D. Cantab., F.R.C.P., Hon. F.A.C.P.
REGIUS PROFESSOR OF MEDICINE IN THE UNIVERSITY OF OXFORD

IT was perhaps appropriate that, on the second day that I devoted to preparing this lecture, I was decanted from an aeroplane at 8 A.M. in Labrador at a temperature of 14°F and at 9 P.M. in Trinidad at a temperature of 90°F. Thus by personal experience I was forcibly reminded of that most remarkable of scientific prophecies "La fixité du milieu intérieur est la condition de la vie libre."

Few scientific generalisations can have proved so challenging. It occurs in *Leçons sur les phénomènes de la vie*, lectures given by Claude Bernard at the College of France two years before he died and published posthumously in 1878. Bernard had come gradually to his views on the constancy of the internal environment and its importance to the organism. In his well-known work on experimental medicine published in 1865,[1] he discussed the constancy of the *milieu intérieur* and listed these physicochemical components: water content, temperature, gases (oxygen, nitrogen, and CO_2), pressure, and chemical composition.

The context of the quotation from the 1878 work is as follows. Bernard divided all life into three forms: (1) "la vie non-manifestée"; (2) "la vie oscillante; vie à manifestations variables et dépendantes du milieu extérieur"; and (3) "la vie constante; vie à manifestations libres et indépendantes du milieu extérieur." Latent life is exemplified by seeds which lie dormant for long periods until, under suitable conditions of temperature and moisture, they germinate; and in the animal world by rotifers and eels, which may also remain dormant for long periods in ice, becoming active again when the ice thaws. Oscillating life is exemplified by nearly all plants (particularly non-tropical plants), whose activity is dependent on season, and by all cold-blooded animals. Only those animals which are warm-blooded are independent of their cosmic surroundings. They exemplify the third and highest form of life. The perpetual changes of cosmic environment do not penetrate into the animal; it is free and independent. Then Bernard goes on: "La fixité du milieu intérieur est la condition de la vie libre, indépendante."

He thus leaves us in no doubt as to the biological importance of the regulation of body temperature. In this lecture I propose to discuss how this is achieved in a healthy man, and in the next how the mechanism is broken through, or disturbed, in disease. I shall concentrate more on the nature of the regulating mechanism and less on the balance-sheet of heat production and heat loss, since this is adequately covered in contemporary and recent accounts. Finally in this lecture, to get perspective, I shall compare briefly the main features of the mechanisms regulating another physical quantity, arterial pressure, and a chemical quantity, blood-glucose.

* The Croonian lectures for 1957, delivered on May 14 and 16 before the Royal College of Physicians of London.

1. The copy in the Royal Society of Medicine library is inscribed "F. Nightingale"; and the notes in the same hand at the end suggest that she had read it.

What are the Parts of the Body whose Temperature is Regulated?

It is an old observation, antedating accurate measurement, that the temperature of the extremities varies much with that of the environment. The idea of constancy of internal temperature arose from measurements of temperature in the mouth, the axilla, the groin, the vagina, and the rectum. More detailed exploration was undertaken by (among others) Claude Bernard, who confirmed that the venous blood leaving the limbs was cooler than the arterial, and that this difference was greater the lower the environmental temperature. He also showed that blood in the inferior vena cava above the hepatic veins was warmer than that in the arteries, and that blood in the right heart was about 0·2°C higher than in the left, and thus in the aorta. Thus the liver contributes materially to heat production and the skin and limbs to heat loss. More recently Eichna et al. (1951) have repeated these measurements in man and found the following deviations from rectal temperature:

Pulmonary artery	−0·26°C
Right ventricle	−0·23°C
Inferior vena cava	−0·26°C
Hepatic veins deep in the liver	−0·03°C

In man, temperatures taken simultaneously from mouth, axilla, and rectum seldom differ from one another by more than 1°C, usually by less. Of these the rectal temperature tends systematically to be the highest; and, because of the greater possibilities for heat loss from the other sites, it has in the past been regarded as the best index to arterial blood temperature. Recent observations show, however, that its behaviour may be misleading in three ways:

1. When the blood is quickly heated or cooled, mouth temperature reflects these changes quickly and in some circumstances nearly quantitatively, while rectal temperature may remain unchanged (Gerbrandy et al. 1954). It follows that, if one is interested in rapid change in arterial blood temperature, the rectum is a bad place from which to estimate it. As we shall see, ignorance of this fact led me astray many years ago.
2. Comparison of aortic and rectal temperatures in people who have had grafting operations on the aorta shows that under ordinary environmental conditions rectal temperature tends to be about 0·3°C higher than aortic temperature (Cooper and Kenyon 1957).
3. The relatively high temperature of the rectum suggests that it may be a source of heat production. The most likely cause is bacterial metabolism in fæces; but oddly enough this has never been investigated.

So far as our present purpose is concerned, the conclusion of this section seems to be that the temperature whose constancy is being maintained is that of the deeper regions of the trunk and head. I shall refer to this as the central body temperature. This conclusion is of considerable relevance to the nature of the thermotaxic mechanism, as I hope later to show.

How Accurate is Temperature Control?

Fig. 1 is taken from the late Sir Charles Martin's Croonian lectures delivered twenty-seven years ago (Martin 1930). It shows the body temperatures of five species of animal after they had been exposed for two hours to temperatures from 5°C to 35°C. At one extreme is the lizard, a cold-blooded animal whose temperature closely reflects that of its surroundings. At the other is the cat, whose temperature is nearly independent of its

environment. The primitive mammals—the egg-laying echidna and ornithorhynchus, and the pouched opossum—occupy intermediate positions. In man the mean rectal temperature has been stated to be 98·2°F (36·8° C) with a variation over the course of a day from a minimum of 97°F (36·1°C) at about 3 A.M. to a maximum of 99·3°F (37·4°C) at about 5 P.M., giving a daily variation of 2·3°F (1·3°C) (Pembrey 1905).

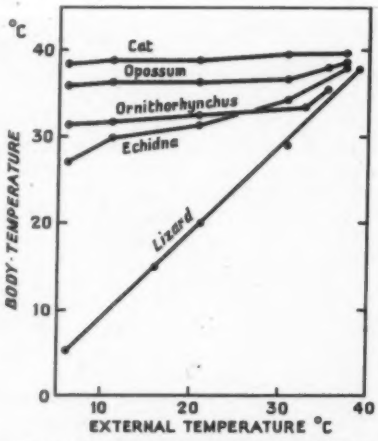


Fig. 1—Variation of body temperature of different species of animals after two hours in environmental temperatures of from 5°C to 35°C (Martin 1930).

Ivy (1944) measured the mouth temperatures of 276 medical students seated in class in Chicago between 8 and 9 A.M. The mean was 98·1°F: 68% were between 97·7° and 98·5°F, 95% between 97·3° and 98·9°F. In statistical terms the mean is thus $98{\cdot}1 \pm 0{\cdot}4$°F.

These limits of variation are relatively narrow, whether we look at the variations in an individual or between individuals. Indeed, Pearl (1940) concluded that the coefficient of variation of body temperature is one of the smallest for which quantitative human data are available. Evidently the homœostatic mechanism concerned with temperature regulation is notable for its efficiency.

What is the Function of Temperature Control?

This was, as we have seen, discussed by Bernard. Temperature control made the organism independent of its external environment. Without it, the animal would be relatively, or nearly completely, inactive at low temperatures. The rate of a chemical reaction is in general proportional to the absolute temperature. As Sir Joseph Barcroft (1934) showed, certain reactions in the body—for example, the union of oxygen and hæmoglobin—obey Arrhenius' law, but several enzyme systems, and such functions as heart-rate and cilia-rate in cold-blooded animals, depart materially from it, the rate of increase being less than would be expected from Arrhenius' law at temperatures approaching 37–40°C.

Not all warm-blooded animals are adjusted to the same temperature as man. Most birds are higher, having normally a rectal temperature of about 42°C (Lefevre 1911). Among mammals the dog and rabbit normally have a temperature of 39–40°C.

I am not familiar with any naturally occurring circumstances in which a temperature lower than 37°C confers an advantage on man; though modern surgery may profit. Higher temperatures occur in fever, where their usefulness still remains to be demonstrated. Athletes commonly warm up before a race. Whether their accession of speed is due to rise of central temperature or to the effect of raised muscle temperature on its properties and performance I do not know; but the latter seems the more probable.

As Barcroft pointed out, one of the chief ills of very high or low body temperature is manifested by the brain, for consciousness tends to become clouded and later lost.

Balance of Heat Production and Heat Loss

The temperature of the body, taken as a whole, is determined by the balance between heat production and heat loss. Heat production consists of what one might regard as obligatory and adjustable components. The obligatory component comprises the heat production of muscle, liver, heart, and other organs carrying out their ordinary functions, whether the organism be at rest or in full activity. This part of heat production is not a part of the device that regulates body temperature; in fact it is the function of the device so to adjust the other mechanisms that this component of heat production is allowed for. The adjustable component of heat production, that which is a part of the mechanism regulating body temperature, is represented by shivering—i.e., involuntary contractions of voluntary muscle mediated through the motor nerves, and brought into play as a reserve mechanism to maintain or raise body temperature.

Heat loss is of course intimately dependent on environmental conditions; and, since in this age of technological warfare the range of conditions to which man is exposed has been greatly widened, much research is being devoted to it. If we ignore the changes due to intake of food and drink, which are ordinarily small, the chief modes of heat loss are (1) from the respiratory tract, by warming inspired air and by evaporation, and (2) from the skin, by radiation, conduction, and convection, by insensible water loss, and by sweating. The dependence of all of these on the environment has been mentioned. Man himself can control the blood-flow through the skin and thus heat lost from it by radiation, conduction, and convection, and he can control sweating. These are the essential components, so far as heat loss is concerned, of the heat-regulating mechanism.

Birds and furred animals also use their coats to regulate heat loss, some having different fur and feathers in winter and summer, and all being able to vary the thickness of the layer of air trapped by the coat to suit environmental circumstances. Dogs and certain other animals increase their heat loss largely by panting, the tongue and the respiratory tract being the surface. Finally, man has adopted clothing. However, not all of us have been so enterprising. Here is an extract from the diary of Charles Darwin for Feb. 25, 1834, when H.M.S. *Beagle* was visiting Tierra del Fuego:

"Whilst going on shore, we pulled alongside a canoe with 6 Fuegians. I never saw more miserable creatures; stunted in their growth, their hideous faces bedaubed with white paint & quite naked.. One full aged woman absolutely so, the rain & spray were dripping from her body. Their red skins filthy & greasy, their hair entangled, their voices discordant, their gesticulation violent & without any dignity. Viewing such men, one can hardly make oneself believe that they are fellow creatures placed in the same world."

Twentieth-century civilisation has reached its finest flower in the American way of life. Bertrand Russell has pointed out that, whereas the older Western civilisations believe that man's function is to adapt himself to his environment, the modern American believes that it is man's function to adapt his environment to suit himself. Central heating, air-conditioning, and the automobile now

contrive to expose the heat-regulating mechanism of the modern American to less strain than perhaps mankind has known through the ages. To the "fixité du milieu intérieur," modern man is adding the "fixité du milieu extérieur."

To summarise, the effector part of the thermotaxic mechanism in man has two parts. Heat production can be increased by shivering. Heat loss can be varied by varying the blood-flow through the skin, and increased by sweating. Variations in skin blood-flow provide the finer adjustments of temperature; shivering is called in by extremes of cold, and sweating by extremes of heat. All these effector mechanisms are under nervous control—shivering through the motor nerves; skin blood-flow and sweating through sympathetic fibres. In other warm-blooded animals panting is added as a defence against heat, and piloerection against cold. These mechanisms are also under the control of the nervous system.

Reflex and Central Control

Now we come to that aspect of the subject wherein has lain my own chief interest. How is the effector side activated? Whence, in other words, comes the information that leads to the opening and shutting of the arteriovenous anastomoses of the fingers, to the secretion of sweat, to the erection of the hairs, and to shivering? In the past it has been usual to distinguish between reflex and central control. Now, the concept of a reflex is quite clear. I cannot do better than quote the master himself, Sir Charles Sherrington (1947):

"The conception of a reflex therefore embraces that of at least three separable structures—an *effector* organ—e.g., gland cells or muscle cells; a conducting nervous path or *conductor* leading to that organ; and an initiating organ or *receptor* whence the reaction starts. The conductor consists, in the reactions which we have to study, of at least two nerve-cells—one connected with the receptor, the other with the effector. For our purpose the receptor is best included as a part of the nervous system, and so it is convenient to speak of the whole chain of structures—receptor, conductor, and effector—as a *reflex-arc*.

"A simple reflex is probably a purely abstract conception because all parts of the nervous system are connected together and no part of it is probably ever capable of reaction without affecting and being affected by various other parts, and it is a system certainly never absolutely at rest."

To most people central control implies the activity of a centre. The idea of a centre is, compared with the idea of a reflex, much less precise. It developed, I suppose, largely to explain respiration. Here was a rhythmic discharge of the central nervous system which ceased when the brain stem was severed in the region of the fourth ventricle. This was most easily explained by the presence in that region of a "centre"—i.e., a group of nerve-cells endowed with autonomous rhythm which could, however, be modified by sensory reflexes and by changing the content of carbon dioxide and oxygen in the inspired air and thus in the arterial blood. It proved convenient to invent other centres—the vasomotor centre, the cardioaccelerator centre, the cardioinhibitory centre, and the temperature centre—according to whether function was lost abruptly by ablation of a specific part of the nervous system, or the appropriate activity evoked by stimulating it. Perhaps this was a feature of the anthropomorphic age of biological science. At any rate it always seemed to me that what were called the lower centres of the brain were occupied by a lot of little men each with a quite specific job to do. Many of these centres have now passed into the limbo of discarded ideas—e.g., the diabetic centre of Claude Bernard, the vomiting centre, and the cardioaccelerator and cardioinhibitory centres. The phenomena to which their conception was due can be explained either because the mechanisms concerned involve tracts with a finite and specific cephalad extension or else because of the location of a specific motor nucleus. Nevertheless the respiratory centre remains, though somewhat shorn of its former powers. It was believed to be autonomous; now it is believed that it is actuated by the hydrogen-ion concentration of certain cells of the medulla. It was believed to be sensitive to arterial oxygen tension; now sensitivity to oxygen is known to be largely localised in the carotid and aortic bodies, whose receptors influence the respiration reflexly.

Those who use the term " temperature centre " usually imply that it is sensitive to changes in temperature, and that in this quality, and the homœostatic effects so evoked, lies its peculiarity. Functionally it is therefore rather a receptor than a centre, and because I have long thought that the concept of centres was not only imprecise but misleading I intend to use the term " central receptor " and not the term " centre " to describe that central structure or structures that respond to temperature with the appropriate homœostatic effects.

Control of Vasomotor Tone in the Skin

Such, though some of the detail is new, was the background against which I saw the problem when I was first introduced to it. It was my second year working with Sir Thomas Lewis. Lewis had the idea that heating the body might produce a vasodilatation in the limbs, accessible to measurement by skin temperature, which might demonstrate the presence and extent of organic vascular disease. We built a chamber that would enclose the trunk and in which the air could be heated by electric-light bulbs. We showed that heating the trunk did in fact produce vasodilatation in the limbs ; that this vasodilatation began first, and was most intense, in those parts of the hand that contained arteriovenous anastomoses ; and that this vasodilatation was effected through the sympathetic nerves. We found that the rate of rise and the final temperatures reached were less in patients with organic vascular disease. We also obtained evidence that suggested to us the presence of vasodilator nerves, using an extremely sensitive preparation—namely, the patient with Raynaud's disease. Subsequently I myself (Pickering 1936), Arnott and MacFie (1948), and Gaskell (1956) have observed that blood-flows through the hand and fingers are not significantly different in normal subjects when the body is heated, with or without previous anæsthetisation of nerves. This has been interpreted to mean that the conclusions Lewis and I drew were wrong. I prefer to think that it is a quantitative question, and that vasomotor nerves to the hand are quantitatively of little significance. As Grant and Holling (1938) showed conclusively, they are much more important in the skin of the forearm.

In view of the long controversy concerning vasodilator nerves to the hand, I think I should make my position quite clear. It seems unlikely that the patient with Raynaud's disease is peculiar in her quota of vasodilator and vasoconstrictor fibres. Rather is it likely that the obliterative lesions of the palmar arch and digital arteries —the basis of severe Raynaud's disease—make vasodilatation difficult in the cold hand and thus reveal that additional vascular dilatation that can be provided by stimulation of vasodilator nerves. In the normal hand,

where the digital arteries are patent, the vasodilatation produced by release of vasoconstrictor tone is so nearly maximal that any extra provided by vasodilator nerves cannot be detected. Hess and I (1933) showed that, as measured by skin temperature, vasodilatation begins later in the foot than in the hand, and we provided evidence that this is due to incomplete release of vasoconstrictor tone in the foot, an explanation that harmonises well with the greater therapeutic effect of sympathectomy in the lower than the upper extremity.

Interesting though this all was, I must confess that I was much more interested in how heating the trunk produced vasodilatation. There were clearly two possibilities—namely, a reflex from the heated skin, or activation of some central structure by the hot blood returning from it. Now, I had spent the year before working with Lewis on the effects of occluding the limb circulation on the pain of muscular exercise, and on nerve conduction. I should have been an inept pupil if I had not realised that here lay a method that would answer the question. Accordingly, when Lewis was on holiday, I set to work to see whether heating the arm whose circulation was arrested would or would not produce vasodilatation in the other.

The difficulty was to get conditions right; for anyone who has worked with skin-temperature knows that conditions are broadly of three kinds: (1) when environmental temperature is so high that the extremities are persistently vasodilated; (2) when the environmental temperature is so low that the extremities are persistently vasoconstricted; and (3) an intermediate zone in which finger temperature is extremely labile and the relationship between stimulus and response hard to establish.

I used a cool room and subjects in whom the finger temperature had been raised to 34°C by heating in the hot box. After the fingers had come out of the box, their temperature fell; and, when it was about 27°C, the other arm was immersed at 44°C with and without the circulation arrested. With circulatory arrest, the skin temperature of the other hand continued to fall, until the circulation was released: some minutes after release of the circulation a vasodilatation similar to that produced by the hot box ensued. The method was, however, an unsatisfactory one,[2] since the time at which skin temperature rises when vasomotor tone is relaxed is greatly affected by local temperature; variations in skin temperature do not therefore accurately reflect the finer variations in vasomotor tone. I therefore

2. And I never published these observations on skin temperature because I never regarded them as being so conclusive as those with Stewart's calorimeter.

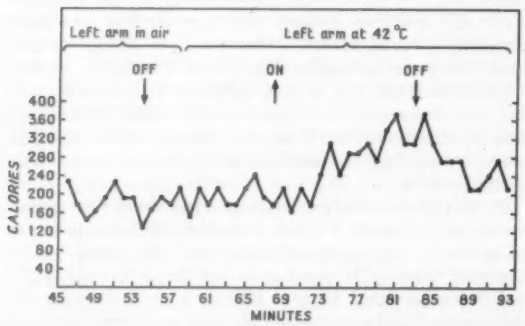


Fig. 2—Elimination of heat from right hand. Left arm was wrapped in cotton-wool till 58th min., when it was immersed in stirred water at 42°C. *Off*, circulation to left arm arrested; *On*, circulation to left arm released. Room temperature 21·5°C (Pickering, *Heart*, 1932).

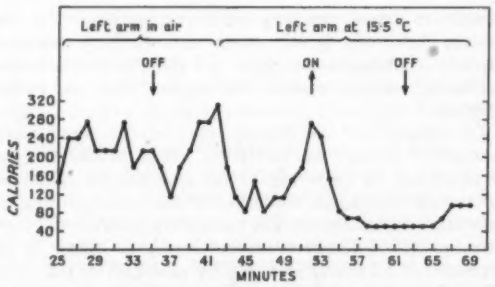


Fig. 3—Elimination of heat from right hand. Left arm was first in air and its circulation arrested at 35th min. (*Off*). It was immersed in water at 15·5°C at 42nd min. and its circulation released at 52nd min. (*On*). (Pickering, *Heart*, 1932.)

changed to Stewart's calorimeter, in which the heat elimination from a hand or foot is measured, using water at 30°C—a temperature at which the hand vessels are neither unduly constricted nor dilated. This method is very robust and reliable, but it is rather slow and does not detect rapid and transient effects.

I found that, when one arm is immersed at 37°C, arresting the circulation to it induced no change in blood-flow in the other hand; if the arm with arrested blood-flow was now immersed in stirred water at 43°C, a transient vasoconstriction, but no vasodilatation, occurred; when the circulation to the hot arm was released, nothing happened for a few minutes, and then a vigorous dilatation began and persisted during the immersion (fig. 2). Clearly the vasodilatation following the immersion of an arm in hot water was not a reflex from thermal receptors in the skin. It arose in some way from the effect of hot blood returning from the limb and acting on a more central receptor.

Cold provided a conspicuous contrast (fig. 3). When the occluded limb was immersed in cold water, a vigorous vasoconstriction began in the opposite hand; but, as the limb remained immersed, the sensation of cold diminished, presumably as the thermal receptors became adapted to the stimulus, and coincidentally the vasoconstriction diminished. If now the circulation was released, after a minute or two the vasoconstriction began again and this time persisted. Cold clearly differs from heat in that it produces a powerful vasomotor response reflexly from the receptors of the skin; it resembles heat in that a further vasomotor response is produced by cold blood leaving the limb and acting on a central structure. Similar phenomena were observed when the leg was immersed in hot or cold water, or when heat elimination was measured from the foot during immersion of the hand.

The phenomena which I had observed were not unlike those observed before, but the procedure of circulatory arrest enabled analysis to be made of the nature and site of the receptors initiating the reflexes.

Vasoconstriction in one hand in response to immersing the other was first observed by Edwards, wrongly supposed to be confined to the symmetrical limb by Tholozan and Brown-Séquard (1858), and correctly demonstrated to be a reflex by François-Franck (1876), the latent period being three seconds. François-Franck also found that the reflex exhibited fatigue on repetition. Stewart (1912), using his calorimeter, showed that immersion of one arm in cold or hot water produced in the other hand a fall or a rise respectively in heat elimination, the former quickly, the latter only after a delay. Although with Laffer (1919) he obtained responses from the insensitive limb of a patient with peripheral neuritis, he never questioned the reflex nature of the response. Nor did Winkler (1902), who found that, in rabbits with the spinal-cord transected, immersion of the insensitive hindquarters in hot water produced flushing of the ears only after a long delay, which he attributed to the time taken to warm the skin of the thermosensitive forequarters.

In view of Winkler's arguments, and doubt as to what kind of thermal gradient would stimulate the thermal receptors in skin, it seemed desirable to see whether similar responses were obtainable from parts of the body entirely devoid of thermoreceptors. Such, as Hertz (1911) showed, is the stomach. Introducing into the stomach, through a tube, 400 ml. of water at 20°C or 800 ml. at 46°C led to the gradual onset respectively of a vasoconstriction and a vasodilatation in the hand, each lasting 15–30 minutes. Water so introduced at 37°C and the circulation of either cold or hot water through a tube curled up in the œsophagus were without effect.

Although, at the time when these experiments were done, the idea of a temperature centre sensitive to changes in blood temperature was being entertained, no real evidence had been adduced for it, and cutaneous vasomotor tone was widely believed to be controlled by reflexes from the skin. The new points arising from my experiments were : (1) direct evidence for control of cutaneous tone by a central structure responding to changes in, presumably, blood temperature ; and (2) the suggestion that this structure might be extremely sensitive. To see how sensitive it was, I measured rectal temperature, and this is where I went astray, because I found that the greatest change induced during a 10-minute period of arm immersion was 0·1°C, and that, though I was using apparatus capable of detecting 0·01°C change, no change in rectal temperature had occurred when the vascular effect began. To check this I also measured the heat gained or lost by the body to the hot or cold water in which a hand was immersed at the instant the vascular response began in the other arm ; about 2·6 kg. cal. had been gained or 1·3 kg. cal. lost by the body. If this heat gain or loss was distributed uniformly over the body, it seemed that the sensitivity of the central structure would be of the order of 0·025–0·050°C.

This estimate has subsequently been corrected by Snell and his colleagues, who found that, whereas similar amounts of heat had to be transferred in their experiments to produce vasodilatation or vasoconstriction (Snell 1954), the change in mouth temperature was so large that it had to be assumed that some structures in the body would have their temperatures changed to the same extent as if the heat transfer were confined to the circulating blood-volume (Gerbrandy et al. 1954). The sensitivity of the central receptor is thus more probably about 0·2°C.

I made one further set of experiments to test the idea that a central receptor or receptors were concerned in body-temperature control.

It seemed to me that, if heat could be provided from within the body, no question of skin receptors would arise. Accordingly I measured heat elimination from one hand while the subject exercised on a stationary bicycle, rectal temperature being measured thermoelectrically. A typical result is illustrated in fig. 4, which shows the effects of three periods of exercise. In each the onset of exercise is accompanied by vasoconstriction in the hand. In the first two periods, which are short, vasoconstriction persists during exercise and is followed by vasodilatation. In the third period, in which the work is longer and harder, vasodilatation begins during exercise and persists after it.

The vasoconstriction which marks the beginning of exercise had not been described in the hand but had been in the gut and spleen by Sir Joseph Barcroft and his colleagues, and is in conformity with the other known phenomena occurring during this period. The vasodilatation occurring either after exercise or during its later stages is clearly compatible with the effects of a rise of blood temperature. Here I ran into difficulties.

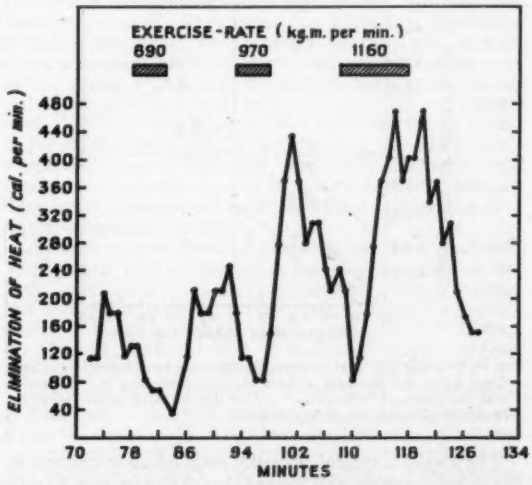


Fig. 4—Elimination of heat from right hand during three periods of work on bicycle ergometer.

I measured rectal temperature and got very unsatisfactory results, which I subsequently found were due to the body becoming electrically charged during exercise. Before I could overcome this difficulty, my attention became diverted to the histamine headache and has since been fully occupied with other things.

It is unfortunately impossible to calculate the heat gained or lost by the body during exercise of this kind, because the resting leg muscles are not at 37°C but at a lower temperature, and so an unknown fraction of heat production must go in internal redistribution of heat.

Although these experiments did not enable a calculation to be made of the sensitivity of the central receptor, they were in conformity with its existence and behaviour suggested previously.

I think I should apologise for having spent so long reliving an intellectual episode now more than a quarter of a century old. Two reasons have impelled me to do so. First, I am one of those who regard scientific research as an intellectual adventure, that can provide the greatest excitement I know. These were the first series of experiments in which the idea, the plan, and the execution were exclusively mine, and they have had that rather special place in my heart that a mother reserves for her firstborn. Secondly these experiments and those subsequently made by Snell (1954) are the only ones which give any idea of the sensitivity of the central structure regulating vasomotor tone in man, and they indicate that it is very sensitive. For this reason I have always wondered whether this structure may not be a specialised receptor [3] whence may pass impulses whose frequency determines the activity of the central nervous mechanisms governing heat production and heat loss. In other words, there may be a central thermal receptor analogous to the baroreceptors of the carotid sinuses and aortic arch, and to the osmoreceptors postulated by Verney.

3. Most receptors are in fact nervous. It may be that the temperature receptors are nerve-cells or nerve-endings located in the central nervous system. Whether this be so or not, if their activity is altered as a result of small changes in a specific environmental quantity (in this instance in the *milieu intérieur*), and if, as a result, complex motor effects are mediated through the central nervous system, then these structures are receptors in the ordinary sense.

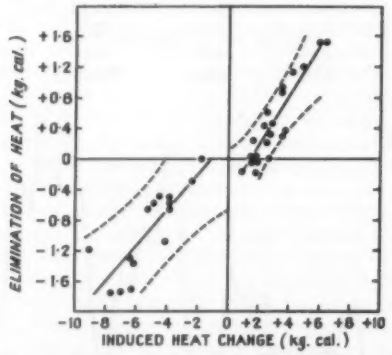


Fig. 5—Relation between increase or decrease in elimination of heat from hand and amount of heat change producing it. Stimulus was intravenous infusion of either hot or cold saline solution. (Snell, *Journal of Physiology*, 1954.)

The idea of a central structure responding to changes in blood temperature also occurred to Gibbon and Landis (1932), who shortly afterwards published experiments similar to mine and who also obtained vasodilatation in the hands by immersing in hot water the insensitive lower extremities of a patient with a transected spinal cord—the human counterpart of Winkler's experiments.

Some of the most important evidence regarding the activity of the central receptor was provided by Snell (1954), who infused hot and cold saline solution intravenously in normal men and was thus able to measure accurately the heat transfer and the ensuing vascular response in the hand. He found that the least heat transfers invariably causing vasoconstriction and vasodilatation were losses of 3·8 and gains of 2·4 kg. calories respectively. He further showed that there is a linear relationship between the sizes of heat transfer and vascular response of the hand, and that the slopes of the two regression lines for heat and cold do not differ significantly (fig. 5). This would be consistent with the existence of a single set of receptors responding either to a rise or to a fall of blood temperature. Furthermore Gerbrandy, Snell, and Cranston (1954) demonstrated a linear relationship between the size of the vascular response of the hand (in kg. calories) and the area of the curve of mouth-temperature (in °C per minute), provoked by intravenous infusions of hot saline solution, though the rectal temperature is commonly uninfluenced. This disposes of one of the main difficulties that other workers have found in recognising the activity of the central receptors, because they have usually measured, as I measured, the rectal temperature, and observed no clear relationship between changes in rectal temperature and changes in vasomotor tone.

These experiments of mine were almost certainly misleading in the idea that they left about the importance of the temperature receptors in the skin. Man is a terrestrial and not an aquatic animal, and the immersion of a part in very hot or very cold water, though a convenient laboratory device, is not a stimulus that we or our ancestors frequently encountered. The vasoconstriction evoked is quite properly seen as merely an aspect of the vasoconstriction that follows any strong sensory stimulus (Hallion and Comte 1894).

Kerslake and Cooper (1950) found that exposing the trunk of a subject to radiant heat induced, after a latency of about 25 seconds, a rise in heart-rate and a vasodilatation in the hand. They have shown that similar changes can be induced by so exposing the lower limbs, and that the responses persist when the circulation to the lower limbs has been arrested. The responses are unquestionably reflex. Curiously they disappear when the lower limbs are sympathectomised. The receptors are thus probably not those that subserve the sensations of heat and cold.

Now, there are two aspects of the behaviour of these receptors which require to be further explored because they are so clearly important :

The first, arising from Kerslake and Cooper's paper (1950) is the suggestion that the reflex is not fatiguable, for irradiating the trunk for 25 minutes gave vasodilatation persisting as long.

The second, supported by the preliminary results of Cooper, Ferris, and Mottram (1956), is that there is a reflex vasoconstriction to exposure to a cold body, that the responses to negative and positive radiation are quantitatively related to the radiant energy lost or gained, and that the lines relating them may be continuous.

If these points are finally established, then it is clear that we have to consider the activity of a set of receptors in the skin which are quite different from those ordinarily recognised and which may reasonably be supposed to have a profound effect on temperature regulation.

To sum up, blood-flow through the skin and probably of the mucous membranes of the mouth and nose (Mudd, Goldman, and Grant 1921) is regulated partly by reflexes from receptors in the skin, probably different from those serving sensation, and partly by the activation of a central structure, perhaps a specialised receptor, that responds to changes in blood temperature of about 0·2°C.

Control of Sweating

Leonard Hill (1921) first showed clearly that sweating is under the control of a central temperature-sensitive mechanism. He found that the sweating induced by sitting in a room at 38°C is stopped in a minute or two by putting the hands under a cold tap. If the circulation to the arms was occluded, sweating did not stop until after the pressure in the cuffs was released. There was no fall in rectal temperature, but calorimetric experiments showed that the rate of heat loss by the hands immersed in cold water was 0·6–1·2 kg. cal. per minute in two experiments.

This, then, is a heat transfer of the same order as has been found to cause vasoconstriction. A great deal of work has subsequently been done which shows a strong correlation between rate of sweating and deep skin temperature (Kerslake 1955). Since there is also a correlation with rectal temperature, some have thought that sweating is controlled by receptors in the skin, and some by central receptors. This is a very difficult problem. If skin blood-flow is in fact controlled by central temperature receptors, and if sweating is similarly controlled, a correlation between skin temperature and sweat-rate might be expected. Hill's experiments still stand as the most definitive.

Control of Shivering

It is an old controversy whether the additional heat production that can be evoked through the thermoregulating mechanism is or is not solely effected through shivering. Shivering is probably the main, if not the sole, mechanism. Electromyographic records show that, at first, the muscle units fire off at different frequencies and out of phase with each other (Burton and Bronk 1937) ;

later the discharges become phasic. The former irregular contraction has been called thermal muscular tone ; the phasic discharge constitutes shivering. Cutting the posterior roots abolishes shivering but not thermal tone. In man shivering is mediated through the anterior roots, activated not by the pyramidal tracts but by the lateral tectospinal or rubrospinal tracts (Uprus et al. 1935).

Rather less is known about the afferent side of control, but it seems that the same two sets of receptors, peripheral and central, are concerned. It is a common experience that, if a subject is cold, either the sudden application of ice to the skin or a blast of cold air may induce shivering in a few seconds—a time interval which is too short for other than a reflex from the skin. On the other hand, if a subject is warm—e.g., after exercise—the same stimuli may not produce shivering. Experiments on dogs (Hemingway 1939) on the whole support these impressions gained from man. However, the strongest evidence for the activity of a central thermosensitive mechanism was that provided by Sherrington (1924), who showed that immersion in cold water of the insentient hindquarters of a dog whose spinal cord was severed produced, after a latent period, shivering in the normally innervated forequarters.

Thermotaxic Centre

Evidence concerning the thermotaxic centre is of two kinds—namely, loss of this function when parts of the brain are removed, and display of the relevant motor phenomena when parts of the brain are stimulated, particularly by heat or cold.

Isenschmid and Schnitzler (1914), by careful section of the brain stem in rabbits, showed that that part of the diencephalon situated in front of the posterior edge of the optic chiasma is unnecessary for heat regulation, and that the integrity of the tuber cinereum is essential.

Ranson and Ingram (1935) produced coagulation necrosis in the brain stems of rhesus monkeys and allowed them to recover. In seven monkeys the ability to protect against rise of blood temperature was lost ; in these the lesion was bilateral in the rostral part of the anterior hypothalamus. Nine monkeys became cold when removed from the warm room ; all three had bilateral lesions destroying the posterior part of the lateral hypothalamus, in the region lateral to the mamillary nuclei.

Evidence for the spatial separation of centres protecting against overheating and overcooling was also obtained in the cat by Clark, Magoun, and Ranson (1939) and in the dog by Blair and Keller (1946).

A major difficulty in investigating the responsiveness of the brain to changes in its temperature is the profound effect of anæsthesia on the vascular system. In man general anæsthesia is commonly associated with an increase in skin blood-flow and a decrease in renal blood-flow (Lee et al. 1953). In the dog Hemingway (1941) showed that pentobarbitone, amylobarbitone, and ether all reduced the ability to protect against low temperatures.

Kahn (1904) heated the carotid arteries of rabbits and cats and observed flushing of the skin when the mouth-temperature had risen by 2°C. Barbour (1912) circulated water through a metal tube in the region of the corpus striatum and found that 42°C was the lowest temperature that caused flushing, and 33°C the highest that caused paling, of the ears of rabbits. These changes are clearly much too large to represent the activities of the central receptors—at least as they are known in man.

Magoun et al. (1938) introduced paired insulated 'Nichrom' electrodes into the hypothalamus of cats under urethane anæsthesia with the Horsley-Clarke steriotaxic instrument and heated the region between them with a high-frequency diathermy current. They found that heating an area of the hypothalamus dorsal and cephalad to the optic chiasma produced acceleration of respiration and sweating of the forepads. Similar results were obtained in cats and dogs under nembutal, chloralose, and urethane anæsthesia by Folkow et al. (1949). In cats the responsive region was 8 mm. caudal to the anterior border of the optic chiasma. In this region a temperature rise of not more than 0·5°C produced slight cutaneous vasodilatation after a latency of 15–20 seconds. This is the strongest evidence concerning the location of a central temperature receptor.

Hemingway et al. (1940) had come to the same conclusion. They placed gold electrodes on the ventral surface of the brain, anteriorly between the optic tracts and over the chiasma, and posteriorly between the pituitary stalk and mamillary bodies. A month later shivering was induced by cold. Heating the anterior electrode with a diathermy current stopped shivering ; heating the posterior electrode did not.

Ström (1950) systematically explored the hypothalamus of anæsthetised cats with one electrode cooled by water and failed to observe any alterations in cutaneous blood-flow or respiratory rate when the anterior or posterior hypothalamus was cooled to 31–36°C. On the other hand, if the anterior hypothalamus was so cooled while heating by diathermy was in progress, the cutaneous heating produced by diathermy disappeared. Cooling the carotid arteries was not effective in cooling the hypothalamus but produced vasoconstriction that was thought to be a reflex from cooling the facial skin.

It has been very generally concluded from the destructive experiments that there are two thermotaxic centres one of which protects against cold while the other protects against heat. In fact all the evidence displays is that the tracts subserving these two functions pass through different areas of the hypothalamus and can be separately interrupted. The evidence that heating a quite local area of the hypothalamus produces changes that duplicate those elicited by exposing the body as a whole to heat is very strong evidence that this is the site of the central receptor responding to heat ; as Folkow et al. (1949) have shown, the rises of temperature are too small to represent a non-specific stimulus. The evidence would be stronger if the same area had been shown to respond to cold, but this is much more difficult technically, and so far the sole evidence is Ström's (1950) observation that cold will inhibit the effects of heating.

Thermotaxis as Example of Homœostasis

Having considered the parts, we may now try to view the whole, to see how the various mechanisms are integrated and coordinated to regulate body temperature. As we have seen, there are three effector mechanisms in man—shivering, cutaneous vasoactivity, and sweating—which regulate heat production and heat loss. All are effected through the nervous system, as are the other two devices of mammalia, polypnœa, and piloerection. These effector mechanisms require the integrity of the central nervous system up to and including much of the hypothalamus. We may assume that the nervous pathways extend cephalad to about this point in the central nervous system.

So far the problem is non-controversial. What is controversial is the way in which this mechanism is activated. A commonly held view is that of Bazett (1949) supported by Burton and Edholm (1955). They consider that cutaneous reflexes play a dominant role and that the chief thermal receptors are those of the skin : "There is no need to postulate a specialised 'thermal receptor' in the brain, for which we have no histological evidence whatever."

They think that there is "definite evidence of the anatomical and physiological separation of the heat loss and heat conservation centres," and they think that the evidence that exists for some central control can be explained by the effect of temperature on the relaying and conducting functions of these centres.

The evidence collected here leads me to think that this is not a correct assessment of the situation. To my mind the evidence points strongly to the dominant role of the central receptor or receptors and the subsidiary role of the cutaneous receptors. Whether the central receptors are situated in the hypothalamus or not is important but not essential to the concept. These several receptors give rise to nervous impulses which are, no doubt, summated and integrated in the brain and excite the various efferent mechanisms.

I think we can take it as established that the thermal receptors of the skin are concerned with temperature regulation. By reason of their situation and of the reflex responses to which they give rise, they are most probably concerned in the immediate protection of the body against hot and cold environments. For example, Sherrington (1924) noted that, when a normal dog was removed from its pen at 26·6°C to a cold room at 1°C, the vaginal temperature at the end of 40 minutes showed a slight rise. Again, Kerslake and Cooper (1950) observed that, when the limbs or trunk are exposed to radiant heat, the reflex vasodilatation in the skin is regularly accompanied by a fall in mouth temperature. In each of these two instances the actual change in central body temperature is the reverse of the environmental change ; reflexes from the skin have overcompensated for the change in the *milieu extérieur*. However, we still have a great deal to learn about the behaviour of these receptors. I used to think that, as François-Franck (1876) first pointed out, they were easily fatigued. It seems probable, however, that the receptors are not themselves responsible for sensation and their detailed behaviour, in so far as this is manifested by reflex changes, remains to be explored.

I think we can take it as established that a central receptor or receptors are also concerned in temperature regulation ; their activity has been demonstrated in the control of cutaneous vasomotor tone, of sweating, and of shivering.

In considering the relative importance of these receptors one major fact stands out—namely, that the constancy achieved in the temperature of the central parts of the body is of a very high degree, whereas that of the skin is not. This consideration alone makes it probable that the central receptors play a dominant, and the skin receptors a relatively subsidiary, role in the long-term regulation of temperature. This case remains incomplete in the sense that the location of the central receptors is not yet proved, nor is it known by virtue of what physicochemical peculiarity they respond in the way that they seem to. Thus, though there is suggestive evidence that areas in the hypothalamus close to the optic chiasma respond appropriately to a rise of temperature, there is virtually none that they respond to a fall. Nor is there any evidence that these areas differ in their histological appearance from other cells of the hypothalamus (Eliasson and Ström 1950).

The concept of the mechanism regulating temperature in man developed here is thus as follows. Small deviations in central body temperature are opposed by corresponding deviations in cutaneous vasomotor tone. Larger deviations upward or downward are opposed respectively by sweating and by shivering. The effector mechanisms are activated chiefly and persistently by central receptors, less importantly and intermittently by cutaneous receptors. Coordination and integration take place within the central nervous system, probably in the hypothalamus or below. The spinal tracts concerned in the control of shivering and vasomotor tone are probably different, and this may account for the way in which protection against heat and cold are differentially affected by localised hypothalamic lesions. Except in this sense it is unlikely that there are different centres for the regulation against heat and cold.

Comparison with Other Homœostatic Mechanisms

The concept here presented of the way in which the temperature of the *milieu intérieur* is regulated assigns a dominant role to receptors that appreciate changes in that milieu—receptors that may properly be called proprioceptors, as opposed to the exteroceptors of the skin. To put this concept into perspective it may be compared with the mechanisms regulating blood-pressure and blood-sugar.

Blood-pressure

The old concept of the regulation of blood-pressure was that both the peripheral resistance and the cardiac output were under the control of autonomous medullary centres—the vasomotor, cardioinhibitor, and cardio-accelerator centres (see Bayliss 1923). The activity of these centres was affected by impulses from the various sensory nerves and the higher centres, and by oxygen and carbon-dioxide content of the blood.

It was always difficult on this concept to see how the blood-pressure was so nicely regulated. However, the work of Hering and Heymans has shown how profoundly defective this concept was. We now know that perhaps the most important regulators of blood-pressure are the baroreceptors of the carotid sinus and the aortic arch ; alterations in pressure in these proprioceptors alter the number of impulses originating from them, and so lead to the reflex initiation of changes in heart-rate and vasomotor tone that tend to oppose the alteration. The effector paths, including those to the adrenal medulla, are nervous, and the mechanism is thus almost a perfect analogue for that here presented as responsible for temperature control.

In addition the renin-hypertensin system is probably concerned in the control of arterial pressure. As to how that control is effected I have nothing material to add to what I presented fourteen years ago (Pickering 1943) ; it is, however, unlikely that a nervous mechanism is involved. This mechanism, if it is indeed concerned in blood-pressure control, has no known analogue for temperature.

Blood-sugar

The control of the blood-sugar level is quite different from either of the foregoing. The first line of defence seems to be the taking up or discharge of glucose by the liver and muscles from or into the blood. This control is effected largely through increase or decrease in the secretion of insulin by the pancreas, which is itself controlled by the sugar content of the blood perfusing it. The second line of defence is the mobilisation of glucose from the liver due to the action of adrenaline, secreted in response to the effects of low blood-sugar level on the cells of the central nervous system.

Here, then, we have a chemical quantity, regulated largely by chemical means—i.e., by hormones, which are themselves controlled by the blood-sugar.

The principle in all these three examples is the same —i.e., if a particular quantity in the *milieu intérieur* is regulated within narrow limits, the regulating mechanism is chiefly activated by alterations in that quantity. It seems to me not improbable that this principle is of quite general application.

(To be concluded)

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"... Few health workers have had a serious chronic illness and so the world of the patient is unfamiliar to them. They may be familiar with his lungs, joints, blood pressure, or blood sugar concentration, but his outlook on life, likes and dislikes, private terrors, and feelings about his family can be as unfamiliar as the uncharted bottom of the sea. ... The worker should remember that chronic illness *is* a way of life. ... He must be careful and tender of feelings, but decisive and affirmative. Patients are made more anxious by too passive an approach."—*Prevention of Chronic Illness*. Commonwealth Fund. Harvard University Press. 1957.

HYPERTENSION FOLLOWING X-IRRADIATION OF THE KIDNEYS

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FOR many years it has been known that X-irradiation may damage the kidneys, but the clinical importance of this has been recognised only recently (Luxton 1953).

Schulz and Hoffmann (1905) were the first to study the histological changes in the kidney following experimental irradiation. In rabbits they observed a great increase of interstitial tissue, together with atrophy of the tubules and glomeruli which they attributed to compression by the new connective tissue. The blood-pressure was not measured, but in one rabbit examined after 48 days (the longest period of observation after irradiation) muscular hypertrophy of the renal vessels was noted.

Hartman et al. (1926) irradiated dogs' kidneys in situ, using high-voltage X-rays to avoid excessive damage to the abdominal wall. They confirmed the earlier finding of a great increase of connective tissue replacing the tubules: the glomeruli were not decreased in number, but in dogs observed for more than 3 months after irradiation they exhibited various degrees of hyaline atrophy. Blood-vessels of all sizes in the kidney showed thickening of their walls and in many cases obliterating endarteritis. Hypertension was noted in these long-standing cases, and death was usually due to renal failure. Later the same workers (Hartman et al. 1927) demonstrated hypertension, renal failure and histological lesions when one kidney of a dog was exteriorised and irradiated, the other being removed and the rest of the body protected by lead. O'Hare et al. (1926) made similar observations in rabbits.

Essentially the same findings were obtained in rats by Bennett et al. (1953), who used whole-body irradiation under anoxic conditions to lower the mortality-rate. With a dosage of 600–1400r, nephrosclerosis and moderate hypertension were observed after 300 days.

In man, evidence of renal damage was reported by Warthin (1907) in patients irradiated for leukæmia. Much later

Dean and Abels (1944) described a most interesting case of a woman, aged 20, with an abdominal mass who received 4600r to the left upper quadrant of her abdomen in 25 days. 7 years later she was found to have hypertension with evidence of impaired function in the left kidney. At operation this kidney was found to be shrunken and fibrotic, and after its removal the blood-pressure returned to normal.

Zuelzer et al. (1950) reported a form of glomerulonephritis in three children who had received therapeutic irradiation (5000–6850r in 4 months) to the renal area. All of them died from renal failure and hypertension within 7 months of the first irradiation. Renal changes included lesions of the glomerular capillaries and Bowman's capsule, tubular atrophy and necrosis, and interstitial fibrosis; no blood-pressure measurements were recorded.

The infrequency of such reports was no doubt due to the rarity of the conditions for which the upper abdominal areas were subjected to high-dosage irradiation.

Luxton's series—the largest yet published—consisted of patients who during treatment of testicular tumours

received intensive irradiation (2300r in 5 weeks) over a wide field including both kidneys. Of those at risk, twenty-seven (about 20%) developed albuminuria; nearly all had hypertension, and in many there was renal impairment.

No serial studies of blood-pressure, urine, or renal function were made from the time of irradiation, because the renal complications were unexpected. Thus many of the cases could be reviewed only retrospectively. From the evidence available it appeared that the blood-pressure rose after an interval of at least 6–12 months after irradiation.

Luxton classified his series clinically into acute and chronic radiation nephritis and benign and malignant hypertension. In the two cases classified as malignant hypertension albuminuria was present when the urine was first examined, but one patient had normal renal function: both patients died within 7 weeks of the onset of symptoms.

Of the whole series seven patients died, and necropsy material from four was studied and reported fully by Russell (1953). In three necropsies on patients who presented with " acute radiation nephritis " the important histological lesions were thickening of the renal capsule, diffuse interstitial fibrosis, tubular degeneration, glomerular hyalinisation, arterial hypertrophy, and arteriolar hyaline necrosis. This picture is in nearly all respects similar to that described in laboratory animals. In one case presenting with malignant hypertension there was again widespread interstitial fibrosis, with a tendency to form dense wedges of sclerotic atrophy. Most of the glomeruli were abnormal and showed partial or complete hyalinisation and occasional hæmorrhagic infarction; the tubules were largely atrophic. Hyaline arteriosclerosis and endarteritis fibrosa of the interlobular arteries, and fibrinoid necrosis of arterioles, were present.

Luxton thought that fibrous thickening of the kidney capsule was a possible but unlikely cause of the hypertension, by analogy with the perinephritis observed when hypertension is produced in animals by enclosing the kidney in a ' Cellophane ' capsule. However, in our studies of malignant hypertension at The London Hospital we have observed cases in which this syndrome followed irradiation of the kidneys, and in two instances there was an apparent dissociation between hypertension and irradiation sclerosis. In these, there was no evidence of diffuse interstitial fibrosis, glomerular hyalinisation, tubular atrophy, or severe thickening of the renal capsule. Indeed, the most significant histological changes in the kidneys were scattered arteriolar and glomerular necroses presenting a picture indistinguishable from that of early malignant essential hypertension.

These findings led us to the view that in certain circumstances irradiation of the kidneys might induce hypertension in the absence of irradiation sclerosis, and that in such cases renal structural changes might be predominantly secondary to the hypertension. In this paper we shall first describe two patients in whom hypertensive renal disease developed after irradiation, illustrating these two distinct patterns of renal structural damage. We shall then present a series of experimental studies in the rat, designed to clarify the relation between hypertension and structural changes in the kidney following irradiation.

Two Types of Hypertensive Renal Disease due to Irradiation of the Kidneys in Man

FIRST CASE

The first patient received deep X-ray therapy for an abdominal carcinoma and died 8 years later with hypertension and uræmia. The histological picture is the common type in which chronic irradiation sclerosis is associated with hypertensive renal lesions.

First Admission

A woman, aged 35, was admitted on March 31, 1946 (no. 40430). Swelling of her ankles had been noticed 6 weeks previously, followed by sudden pain in her right calf after 3 weeks and swelling of the whole limb.

Examination.—Signs of right femoral thrombosis: large firm upper abdominal mass; moderate ascites. Apex-beat not displaced. Blood-pressure 160/100 mm. Hg; falling to 120/80. Urine: sp. gr. 1·015, no albumin. Hb 88%, leucocytes 7300 (normal differential count). Wassermann reaction negative. Barium meal and chest radiograph normal. Intravenous pyelogram normal.

Laparotomy (April 3, 1946).—" Solid lobulated mass attached firmly to posterior abdominal wall, probably connected with pancreas." Microscopical report on biopsy specimen: " piece of pancreas, infiltrated by carcinoma composed of solid groups of small polygonal cells."

Deep X-ray therapy started on May 28, 1946. Upper abdominal baths, 3000r, 26 treatments in 35 days. During the next 12 months the ascites and abdominal mass gradually diminished. The patient ceased to attend hospital, and remained well for some years.

Second Admission (May 4, 1954)

Generalised aches and malaise for 2 weeks, and frequent vomiting for 3 days. Sallow complexion; pulse 110; neck veins distended, well-marked pulsation in suprasternal notch. Apex-beat in mid-axillary line. Heart sounds normal. Blood-pressure 190/115. Death occurred suddenly soon after admission.

Postmortem Findings

Kidneys contracted (left $3^1/_4$ oz., right $1^1/_8$ oz.), granular subcapsular surface, cortex narrowed, arcuate arteries prominent. Great hypertrophy of left ventricle; considerable atheroma.

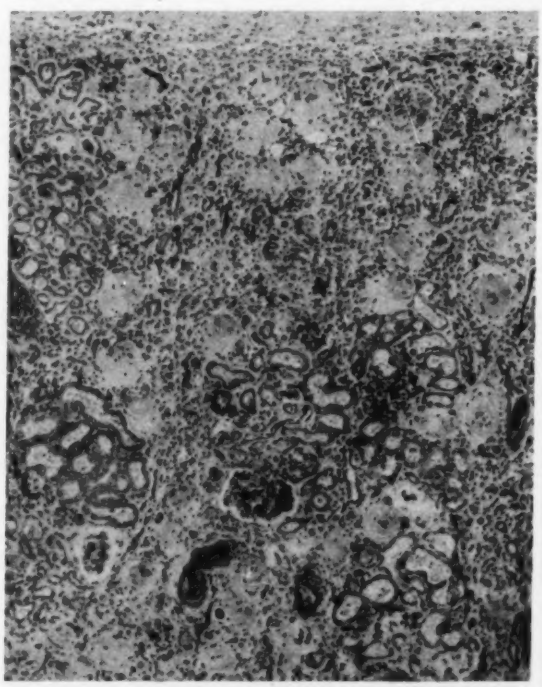

Fig. 1—Case 1, malignant hypertension following irradiation of kidneys: irradiation sclerosis of kidney. (Hæmatoxylin and eosin. × 57.)

Œdema of lungs. Membrano-hæmorrhagic "uræmic" colitis No definite abnormality in or around pancreas.

Histology of kidneys (fig. 1).—Gross disorganisation of renal pattern, particularly in the smaller kidney; variable fibrous thickening of capsule.

Glomeruli: not significantly reduced in number, but more than half show hyaline degeneration of tuft and great collagenous thickening of Bowman's capsule. Many hyaline glomeruli are aggregated in subcapsular areas of fibrosis (fig. 1), but others are scattered throughout cortex. Most other glomeruli appear normal, but a few show acute focal, sometimes hæmorrhagic, necrosis of tuft.

Tubules: very severe diffuse atrophy, with slight dilatation.

Vessels: frequent fibrinoid necrosis of afferent arterioles and interlobular arteries. Endarteritis of some interlobular arteries; fibroelastic intimal thickening and medial hypertrophy of larger arteries.

Interstitial tissue: diffuse fibrosis, moderately cellular, with fairly uniform collagen deposition involving both cortex and medulla.

This patient had a normal blood-pressure when, at the age of 35, she received irradiation to the upper abdomen over a wide field, including the kidneys. When hypertension developed is unknown, because she was not observed until symptoms of uræmia appeared 8 years later. The interstitial fibrosis, atrophy of the glomeruli with fibrosis of their capsules, and the changes in the larger arteries indicate a longstanding and slowly progressive nephrosclerosis. Fibrinoid arterial and arteriolar necroses and glomerular necroses are evidence of terminal acute hypertensive renal damage. In many ways these structural changes resemble malignant nephrosclerosis superimposed on benign nephrosclerosis; nevertheless in certain respects the picture differs from any other form of Bright's desease. The features characteristic of irradiation nephrosclerosis are the diffuse interstitial fibrosis and the large numbers of fibrohyaline glomeruli, both aggregated in subcapsular fibrotic zones and diffusely scattered through the cortex.

SECOND CASE

The second patient received deep X-ray therapy after orchidectomy for seminoma of testis and died 11 months later with hypertensive heart-failure and uræmia. The histological picture is indistinguishable from that of early malignant essential hypertension.

A man, aged 27, underwent right orchidectomy for seminoma of testis in October, 1947. Blood-pressure 140/90 mm. Hg, urine normal. From January to February, 1948, he was treated with deep X-ray therapy to para-aortic regions. Upper abdominal baths, 3000r, 26 treatments in 36 days. On Dec. 18, 1948, he was admitted to The London Hospital (no. 4285) complaining of severe breathlessness, weakness, and dimness of vision.

Examination.—Orthnopnœic, Cheyne-Stokes respiration, blood-pressure 210/130, pulsus alternans. Apex-beat 6th space in anterior axillary line; gallop rhythm; crepitations at left base; liver enlarged and tender; speen palpable. Optic fundi: bilateral papillœdema and exudates, distended veins, and narrowed arteries. Urine: albumin, trace to $^1/_4$ volume, sp. gr. 1·010; moderate number of granular casts and red blood-cells. Blood-urea 150 rising to 270 mg. per 100 ml. Hb 34%. X-ray of chest: mottled shadows suggesting pulmonary œdema. Condition deteriorated rapidly; death on Jan. 4, 1949.

Postmortem Findings

Kidneys not contracted (12 oz.); capsule adherent in parts; scattered petechiæ on subcapsular surface. Great œdema of lungs, small pleural effusions. Heart $17^1/_4$ oz., great hypertrophy and moderate dilatation of left ventricle, coronary arteries free from atheroma; moderate atheroma of aorta. Œdema of liver and spleen. No evidence of secondary growth.

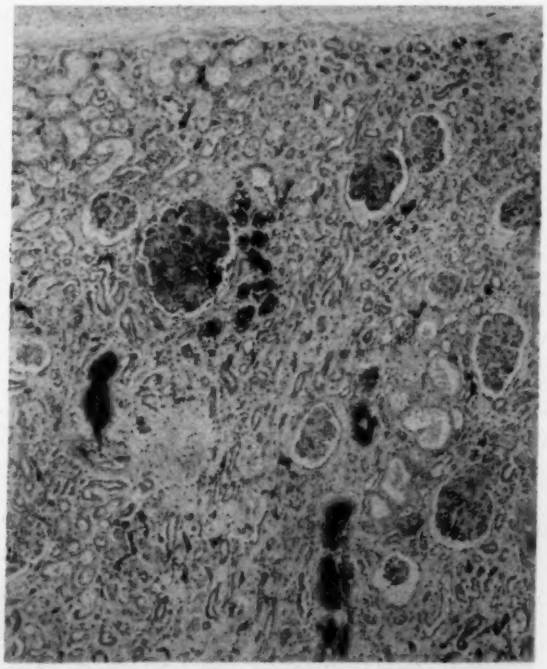

Fig. 2—Case 2, malignant hypertension following irradiation of kidneys: glomerular and arterial necrosis without irradiation sclerosis (Hæmatoxylin and eosin. × 57.)

Histology of kidneys (fig. 2).—No distortion of renal pattern. Focal subcapsular scarring with adhesion and thickening of renal capsule in these areas, but no general capsular fibrosis.

Glomeruli: not diminished in number; majority appear normal, but many show acute, often fibrinoid, sometimes hæmorrhagic necroses (fig. 2). Capsular epithelial proliferation in a few glomeruli, early capsular fibrosis in others.

Tubules: not dilated; diffuse albuminous degeneration, severe in places, occasional hyaline droplet degeneration. Some tubules contain red-cell aggregates, others altered blood.

Vessels: severe fibrinoid necrosis of scattered arterioles and interlobular arteries, no endarteritis. Medial hypertrophy but only slight intimal elastic hyperplasia in larger arteries.

Interstitial tissue: diffusely increased in cortex and medulla owing largely to œdema, but with slight cellular proliferation; congestion of intertubular capillaries.

This patient had a normal blood-pressure when, at the age of 28, he received irradiation to the renal areas. He died of malignant hypertension less than a year later. Histologically acute arterial and glomerular necroses are the most prominent lesions, a picture closely resembling malignant essential hypertension in its early stages. The interstitial œdema could be explained by terminal heart-failure, of which the other organs showed ample evidence. There was no irradiation sclerosis.

The contrasting histological patterns in these two cases indicated the dual nature of irradiation damage to the kidneys in man. It was the recognition of this which led us to undertake the following experimental investigation.

Irradiation of the Kidneys in Rats

METHODS

Experiments were performed with rats of the Wistar strain. All the experiments reported here were on female rats which, at the time of irradiation, were aged 86–97 days, weighed 154–195 g., and had a systolic blood-pressure of 95–130 mm. Hg. The systolic

IRRADIATION OF KIDNEYS IN RATS (1100r single dose)

—	Experiment 1 (irradiation both kidneys exteriorised)	Experiment 2 (irradiation of one kidney exteriorised)	Experiment 3 (band irradiation of both kidneys in situ)
Number of rats	5	11	12
Highest systolic blood-pressure (mm. Hg)	150–220	175–235	155–200 (155–230 after one kidney removed)
Interval from irradiation to hypertension (days)	126–216 (average 155)	152–266 (average 215)	167–287 (average 230)
Controls	Kidneys exteriorised without irradiation (4 rats)	One kidney exteriorised and replaced (6 rats)	Irradiation over chest (5 rats), irradiation of pelvis (3 rats), no irradiation (10 rats)

blood-pressure was measured weekly under light ether anæsthesia by a modification of the tail-plethysmograph method (Byrom and Wilson 1938). The upper limit of normal blood-pressure was taken as 140 mm. Hg. The rats were maintained on the stock diet and drank tap-water.

X rays were from a Victor therapy set working at 200 kV and 10 mA. The rays were filtered through 0·5 mm. of copper plus

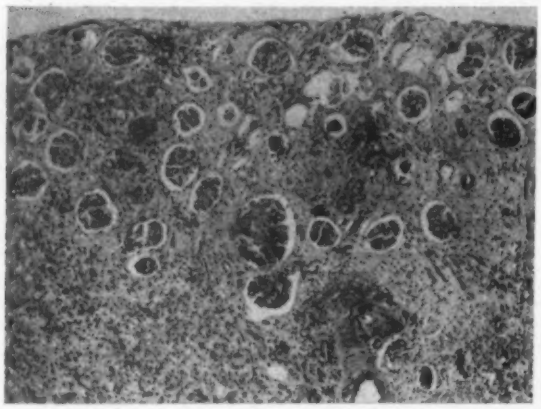

Fig. 3—Experiment 1, irradiation of both exteriorised kidneys of rat: irradiation sclerosis with severe fibrinoid necrosis of arteries. (Hæmatoxylin and eosin. × 58.)

1 mm. of aluminium. The half-value layer was 1·0 mm. of copper. Irradiation was applied to the rats by means of special 'Perspex' applicators mounted on a base-plate fixed to the main tube housing after the normal "master-cone" had been removed. The focus-skin distance was 16 cm. The dose-rate at the applicator face was about 300r per minute with back scatter, and the total dosage in all cases was 1100r[1] at the proximal surface of the kidney, administered at one exposure. This dosage was selected after preliminary trials had shown it to be the most consistent in producing hypertension compatible with long survival. The dosage assessment, based on suitable ionisation-chamber measurements, was considered accurate to ±5%. During exposure the rats were kept under ether/air anæsthesia.

Two forms of application were used:

(1) The rats were placed prone and a perspex applicator measuring 5 × 3 cm. was brought down from above until it was gently pressing on the spine in a transverse direction across the axis of the body. Thus a 3 cm. band of irradiation could be administered to the rat across the body at any level. The upper and lower limits of the kidneys were defined by palpation under anæsthesia and marked on the shaved skin of the back. The distance between these limits was less than 3 cm., and the applicator could be so placed that both kidneys received the dosage. This form of irradiation we call "band irradiation of kidneys in situ". In control groups the band of irradiation was placed either above the upper or below the lower limits of the kidneys.

1. This dosage was measured before the recent reassessment of the röntgen (Kemp and Hall 1954; Smith 1955) and corresponds to 1175r on the new assessment.

(2) One or both kidneys were drawn out on to the rat's flank through loin incisions (after freeing the suprarenal gland), and two lead shields with central slots were slipped in opposite directions beneath the kidney with the renal pedicle lying in the slots, thus effectively shielding the rest of the body from irradiation. A special perspex applicator, of kidney size and shape, was then brought in contact with the kidney, which was immediately replaced after irradiation. This procedure we call "irradiation of the exteriorised kidney".

RESULTS

Experiment 1: Irradiation of Both Kidneys Exteriorised

The details of this experiment are shown in the accompanying table. Although only five rats were included in this group, the results were remarkably uniform. Hypertension developed in 126–216 days after irradiation (average 155 days), and the range of the maximum blood-pressure was 150–220 mm. Hg. Controls were provided by repeating the exact operative technique without irradiation, and all these were normotensive at the end of the observation period of 416 days.

Pathological findings in kidney (fig. 3).—The kidneys were examined after 1–4 weeks' hypertension. They were moderately contracted.

Histological examination showed severe zonal fibrosis with moderate to severe tubular atrophy. Glomeruli in the atrophied areas were crowded together and showed hyaline fibrosis and shrinkage of the glomerular tufts, with slight collagenous thickening of Bowman's capsule. In less damaged kidneys many of the glomeruli within the scarred areas appeared relatively normal. Outside the areas of fibrosis the renal tissue either appeared normal or showed moderately severe tubular degeneration. In both the fibrotic and the non-fibrotic areas of the kidneys acute fibrinoid necroses of glomeruli and arterioles were common.

The kidneys of the controls showed no abnormality.

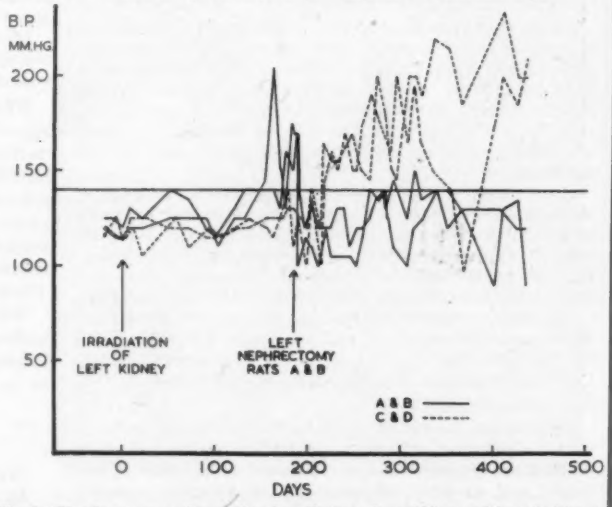

Fig. 4—Blood-pressure of rats after irradiation of one kidney, with and without subsequent removal of irradiated kidney.

Conclusions.—Following irradiation of the exteriorised kidneys in the rat, hypertension develops after a latent interval similar to that seen in man. Histologically a picture of irradiation sclerosis is produced which very closely resembles that seen in the human kidney.

Experiment 2: One Kidney Exteriorised and Irradiated

Fibrinoid necrosis of arterioles and necrotic lesions in the glomeruli form a fairly constant and prominent feature of irradiation sclerosis. Since it has been shown in other experiments, using the technique of renal-artery constriction, that these lesions are secondary to hypertension (Wilson and Byrom 1939), an experiment was devised to see whether this relationship could also be demonstrated in irradiation sclerosis. For this purpose it was decided to irradiate one kidney in the hope that a comparison of the vascular lesions in the irradiated kidney with those in the opposite kidney might provide an answer to this problem.

The details of this experiment are shown in the table. Eleven rats were included in the series, and in six controls the operative technique was repeated but without irradiation. The intervals from irradiation to hypertension were longer than in the first group with limits of 152 to 266 days (average 215 days). The maximum blood-pressure range was 175–235 mm. Hg. After the blood-pressure rose it remained high, but there were large fluctuations sometimes associated with hypertensive crises. In two rats the irradiated kidney was removed shortly after the development of hypertension, and in these the blood-pressure fell promptly and remained normal throughout the observation period. Fig. 4 shows this sequence compared with sustained hypertension in two rats in which the irradiated kidney was not removed.

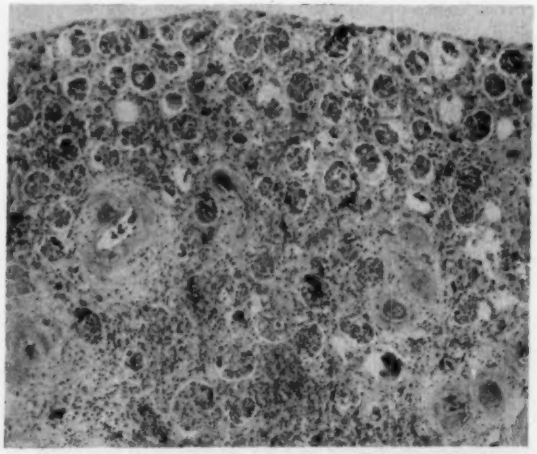

Fig. 6—Experiment 2, irradiation of one exteriorised kidney of rat: irradiation sclerosis with severe fibrinoid necrosis involving large and small arteries. (Hæmatoxylin and eosin. × 58.)

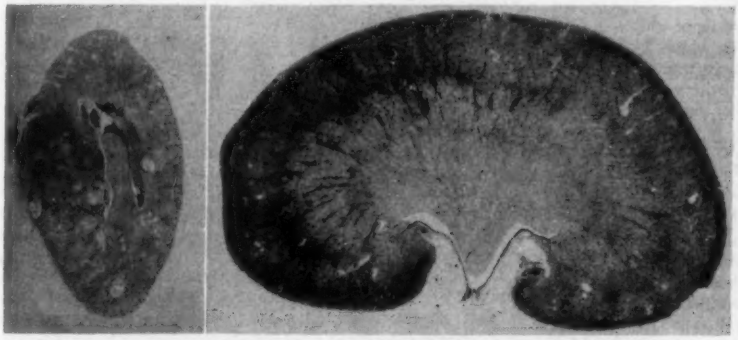

Fig. 5—Experiment 2, irradiation of one exteriorised kidney of rat: irradiated kidney contracted, non-irradiated kidney hypertrophied (× 4½).

Pathological findings in kidneys.—In nine rats of the irradiated group both kidneys were examined histologically after hypertension had been present 14–218 days. In contrast with the previous experiment the irradiated kidney was grossly contracted in all the rats and the opposite kidney was considerably enlarged (fig. 5).

Microscopically the irradiated kidney showed similar changes to those described in experiment 1, except that fibrosis was much more extensive and severe, and tubular atrophy and regenerative hyperplasia were more marked (fig. 6) and in some instances neoplastic changes had developed. The opposite (non-irradiated) kidney showed various degrees of acute and organised lesions (fig. 7), which included fibrinoid necrosis of arterioles and glomeruli (fig. 8), focal tubular dilatation, and hyaline droplet degeneration of the tubular epithelium. These changes were identical with those observed in the opposite kidney after unilateral renal-artery constriction (Wilson and Byrom 1939, 1941).

The extent and severity of the lesions in the non-irradiated kidney were roughly related to the degree and duration of the hypertension. In one rat the blood-pressure remained normal 200 days after irradiation and no lesions were found in the opposite kidney; furthermore fibrinoid arterial necrosis was not seen in the irradiated kidney of this animal, although irradiation sclerosis was very severe.

When a comparison was made of fibrinoid arterial lesions in the irradiated and non-irradiated kidneys, it was obvious that, though similar in

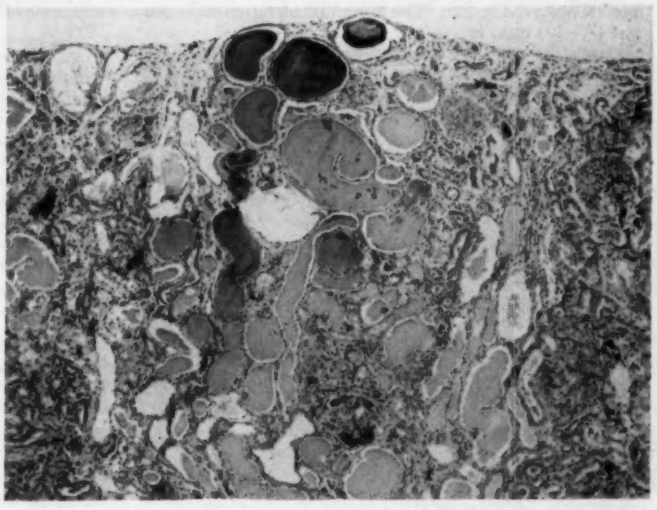

Fig. 7—Experiment 2, irradiation of one exteriorised kidney of rat: secondary hypertensive damage in opposite (non-irradiated) kidney. (Hæmatoxylin and eosin. × 58.)

nature in the two kidneys, the lesions were of much greater severity in the irradiated kidney, and there was a constant tendency for larger vessels to be affected.

In the two members of this series referred to above in which the irradiated kidney was removed as soon as hypertension was noted, examination of the remaining (non-irradiated) kidney showed no lesions in one case and a few scattered healed lesions in the other. From a comparison with the non-irradiated kidneys which in other rats had been left in situ and which were exposed to hypertension for various intervals, it seems to be established beyond doubt that the structural changes observed in the opposite kidneys were secondary to the hypertension. No lesions were found in the kidneys of the controls, and all the controls were normotensive at the end of the period of observation (430 days).

Comment.—This experiment showed that, in the rat as in man, irradiation of one kidney produces irradiation sclerosis and hypertension. It is shown that, if the irradiated kidney is removed soon after hypertension develops, the blood-pressure returns to normal. If, however, the kidney is not removed and hypertension persists, hypertensive lesions appear in the opposite kidney and rapidly increase in extent. In character they resemble the fibrinoid vascular lesions which are present in the irradiated kidney, but in the latter they are more extensive and involve larger arteries. Moreover, in one rat the blood-pressure remained normal though interstitial fibrosis was severe, and in this animal fibrinoid vascular lesions were not seen in either the irradiated or the non-irradiated kidney.

This experiment therefore provides evidence of two distinct pathological processes, separated in time, which lead to renal structural changes after irradiation—namely, interstitial fibrosis and hypertensive vascular damage. Furthermore, from our observations in man it seemed possible that high blood-pressure and the vascular lesions resulting from it might occur independently of the interstitial fibrosis which follows irradiation. The next experiment provided additional support for this hypothesis.

Experiment 3: Irradiation of Both Kidneys in Situ

To reproduce more closely the conditions in man, the kidneys of the rat were now irradiated without operative interference by " band irradiation in situ ". Details of the experiment are shown in the table. Twelve rats were irradiated and controls received irradiation of the chest (five rats), or pelvis (three) or no irradiation (ten). Hypertension was noted 167–287 days (average 230 days) after irradiation—i.e., somewhat later than in the previous experiments but comparable with the interval observed in man. The maximum blood-pressure range was 155–200 mm. Hg.

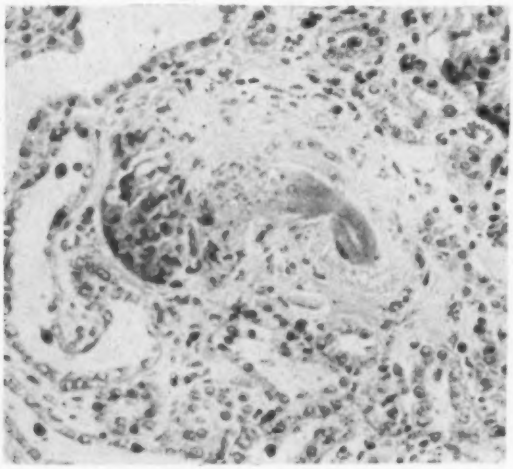

Fig. 8—Experiment 2, irradiation of one exteriorised kidney of rat: fibrinoid necroses of arteriole and glomerulus in non-irradiated kidney. (Hæmatoxylin and eosin. × 195.)

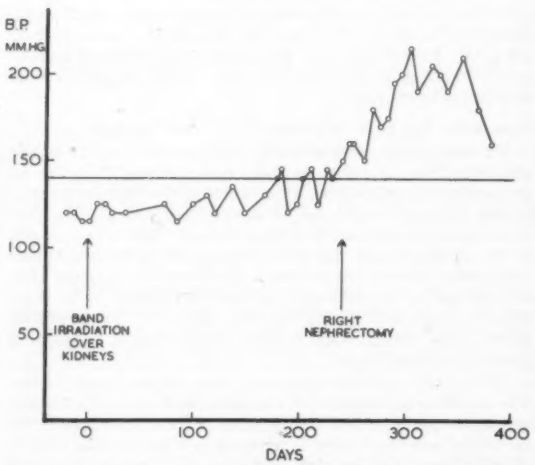

Fig. 9—Blood pressure of rat after band irradiation of both kidneys in situ.

To follow the development of structural changes in the irradiated rats, one kidney was removed when two successive readings at weekly intervals showed a blood-pressure of 145 mm. or over. After this operation the rats survived for periods ranging from 10 to 178 days, during which the range of maximum blood-pressure was 155–230 mm. Hg. Fig. 9 illustrates a typical example.

Pathological findings in kidney.—The only changes found in the *first kidney*, removed as soon as hypertension appeared, were scattered focal glomerular and arteriolar necroses. The general architecture of the kidney was unchanged, and in some rats the kidney appeared normal apart from very occasional glomerular lesions (fig. 10). The *second kidney* was examined in five cases, the intervals after first nephrectomy being 14, 25, 34, 138, and 147 days; the postoperative maximum blood-pressures were 215–230 mm. Hg in four of these rats. Glomerular and arteriolar lesions with secondary tubular atrophy and focal interstitial fibrosis resembled the appearances in the first kidney but were generally much more extensive and severe and occasionally gave rise to gross disorganisation of the renal pattern. These changes are illustrated in figs. 11 and 12.

A comparison with figs. 7 and 8 indicates the remarkable similarity with the hypertensive lesions in the non-irradiated kidney in experiment 2. There was a rough proportionality between the severity of the hypertension before and after the first nephrectomy and the severity of the histological lesions in the two kidneys. Thus in one rat in which the highest blood-pressure was 160 mm. Hg for not more than 10 days before nephrectomy, the first kidney showed minimal lesions. In this rat hypertension persisted after nephrectomy for 138 days with a maximum level of 215 mm Hg, and the second kidney showed extremely severe changes.

Among the controls, two of the five irradiated over the chest showed an occasional blood-pressure above 140 mm. Hg, as did one of the three controls irradiated over the pelvis. Scatter of radiation might explain these slight abnormalities. In three rats, two of which received irradiation over the chest and one over the pelvis, isolated tubular segments appeared dilated and contained hyaline casts. The corresponding glomeruli occasionally showed capsular thickening or adhesions. These rats were 18–24 months old and had been normotensive throughout. The lesions bore no resemblance to those in hypertensive rats and were not thought to be relevant. No lesions were found in other organs in these groups.

Of the rats which received no irradiation, all were normotensive throughout the 450 days of observation save one in which two readings were 145 mm. Hg. The kidneys in this group showed no abnormality.

Comment.—In this experiment irradiation of the kidneys in situ produced hypertension which was not accompanied by the irradiation sclerosis described in our previous experiments. Histological examination of one kidney when the blood-pressure first became high showed slight focal necroses in arterioles and glomeruli—i.e., changes which had all the characters of early secondary hypertensive lesions as described by Wilson and Byrom (1939). Longer exposure of the remaining kidney to hypertension led to various grades of renal damage indistinguishable from that found in the non-irradiated kidney when hypertension was produced by irradiation of the contralateral kidney in experiment 2. The renal structural changes observed in this experiment are comparable with those found in some patients who develop malignant hypertension after irradiation of the kidneys, as shown by case 2 (fig. 2).

We considered the possibility that the rise in blood-pressure might be due either to renal capsular fibrosis or to hilar fibrosis causing compression of the renal artery, but we found no evidence of such lesions, and in no instance did the kidneys show signs of chronic ischæmic atrophy. Furthermore, if hypertension were due to constriction of the main renal artery, we might expect, on the basis of the original experiments of Wilson and Byrom (1939), that the kidneys would be "protected" from hypertensive vascular damage.

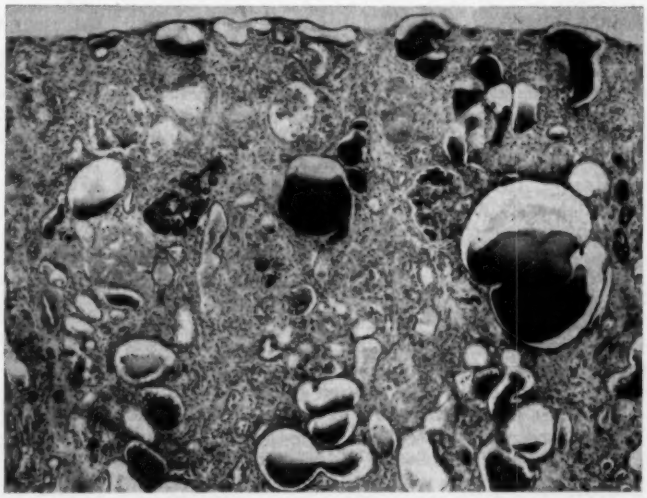

Fig. 11—Experiment 3, irradiation of both kidneys of rat in situ: structural changes in second kidney exposed to severe hypertension for several months. (Hæmatoxylin and eosin. × 58.)

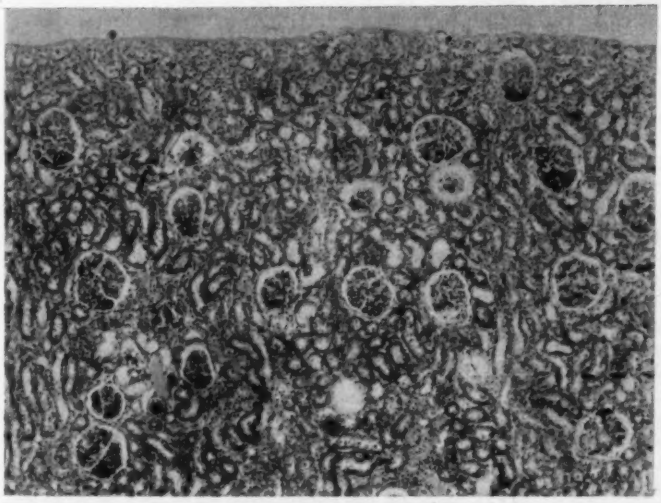

Fig. 10—Experiment 3, irradiation of both kidneys of rat in situ: normal appearance of first kidney removed at onset of hypertension. (Hæmatoxylin and eosin. × 58.)

Discussion

From these observations in man and experiments in the rat we are led to conclude that irradiation of the kidneys has two distinct and independent biological effects: (1) interstitial fibrosis and (2) hypertension. Both in man and in the rat these effects may develop together or separately. When they are associated, the structural changes in the kidney present a composite picture of the results of interstitial fibrosis and of hypertensive vascular damage. The two effects have different time relations. Under the conditions which give rise to interstitial fibrosis this process is far advanced when the blood-pressure first rises. Hypertension, on the other hand, takes 4–9 months to develop in the rat, a latent interval similar to that observed in man.

In the rat, as in man, there are many parallels between this and other forms of renal hypertension. Thus irradiation of one kidney produces hypertension, and removal of the irradiated kidney may bring the blood-pressure back to normal. Secondary hypertensive lesions appear in the opposite kidney, and there appears to be a relation between severity of hypertension and extent of these secondary lesions.

The most important conclusion from these observations is that, both in man and in the rat, hypertension may be produced by irradiation of the kidney in the absence of the structural changes usually found in

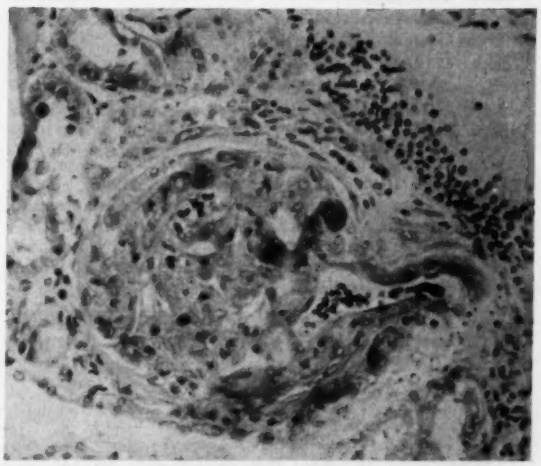

Fig. 12—Experiment 3, irradiation of both kidneys of rat in situ: fibrinoid necrosis of arteriole and glomerulus in same kidney as in fig. 11. (Hæmatoxylin and eosin. × 130.)

irradiation sclerosis. Later, structural changes do occur; but both in man and in the rat they closely resemble the lesions of human essential malignant hypertension, and they must be regarded as secondary to the high blood-pressure. These experiments provide evidence, therefore, that renal hypertension can develop without any preceding anatomical lesion, at any rate as revealed by direct microscopy. Certainly there are none of the anatomical changes in the kidney which are known to produce high blood-pressure in man or in laboratory animals.

Our present experiments do not indicate how renal irradiation produces hypertension, nor do we know what factors determine the development of irradiation sclerosis on the one hand, or hypertension on the other, or indeed the two effects together. Further experiments are being made to investigate these problems. The latent interval of several months before hypertension appears is a regular and striking phenomenon both in man and in the rat. Furthermore, we observed that, in rats which became hypertensive after irradiation of one kidney, fibrinoid necroses of the arteries were more severe in the irradiated than in the non-irradiated kidney and involved larger vessels; this suggests either that hypertension induces more severe lesions in an already damaged kidney (which is not supported by the histological findings in human kidneys when malignant hypertension is superimposed on pre-existing chronic nephritis) or that exposure to irradiation leads to greater vulnerability of the arterial wall. In studies on radiation damage to the brain in rabbits (Russell et al. 1949) fibrinoid arterial necrosis was found in the area of irradiation. Dosage was much larger, and the post-irradiation interval rather shorter, than in our experiments. Blood-pressures were not measured, but there is no reason to suspect that hypertension was present. These findings suggest that, in the brain, acute arterial damage may result directly from irradiation of high intensity. These observations agree with our own in suggesting that irradiation has a definite impact on the vascular system. Perhaps the arteries of the kidney are rendered more susceptible to physiological stress, with the result that whatever factors control basal arteriolar tone lead to excessive vasoconstriction. The long latent interval between irradiation and hypertension remains unexplained but may be related to the regeneration time of vascular tissue and the selective effect of irradiation on immature cells.

The results here presented may have some relevance to the question of a renal mechanism in essential hypertension. In his Croonian lectures of 1942, Sir Arthur Ellis said:

> "The evidence that essential hypertension is due to primary renal vascular lesions is at present insufficient. It is quite possible of course that the mechanism of production of essential hypertension is renal ischæmia, but if this is so it seems more probable that the renal ischæmia is at first functional, being due to some extrarenal factor, and is only later aggravated by renal arteriosclerosis."

Our present clinical and experimental observations seem to us to support the possibility that a functional vascular disturbance of the kidney could be the forerunner of essential hypertension.

Summary

Observations in man and experiments in rats are described showing that X-irradiation of the kidneys may produce two biological effects—interstitial fibrosis and hypertension. These appear to be independent of one another.

Irradiation sclerosis of the kidney is a composite picture of structural damage due to these separate processes.

These observations explain the different histological changes which may be associated with the syndrome of malignant hypertension, following irradiation of the kidneys in man.

Evidence is provided that renal hypertension may develop in the absence of any recognisable structural lesion.

We are indebted to Prof. D. S. Russell and the late Dr. G. W. Boden for helpful discussion. We wish also to thank Professor Russell for the necropsy findings, Miss Esme Nichol for technical assistance, and Mr. Alan Perry, Lord Evans, and Dr. F. Ellis for permission to report cases under their care.

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PREGNANCY AND COARCTATION OF THE AORTA*

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COARCTATION of the aorta is not uncommon: Blackford (1928) estimated its incidence at 1 in 1500. Males predominate over females in a ratio of 3:1. Pritchard's (1953) estimate for females was between 1 in 1000 and 1 in 3000. Whatever the exact figure, one may expect coarctation and pregnancy to coexist occasionally; and the improvement both of diagnosis and of surgical treatment is likely to focus attention more strongly upon management of the pregnancy in such patients. Because there is some uncertainty about the influence of pregnancy on coarctation, I have attempted to evaluate the risks.

Coarctation Considered Alone

The congestive heart-failure which may occur in infancy (Mustard et al. 1955) need not be considered here.

MORTALITY

Necropsies have shown that most patients with the "adult" type of coarctation die before the fifth decade of life:

74% of Abbott's 200 patients (all of them aged more than 3 years) (Abbott 1928, Hamilton and Abbott 1928) and 61% of 104 patients reported by Reifenstein et al. (1947) died before the age of 40.

* Based on a paper read to the symposium on Non-Toxæmic Hypertension in Pregnancy, organised by the Institute of Obstetrics and Gynæcology and held at Hammersmith Hospital, London, on July 4 and 5, 1957.

TABLE I—COMPLICATIONS IN 73 CASES OF COARCTATION OF AORTA

Local	Remote
Aneurysm of aorta : Dissecting : 2 cases Non-dissecting : 4 cases *Intercostal aneurysm :* 10 cases *Manifest infection or vegetations in the coarctation :* 10 cases	Cerebral vascular accidents : 4 cases

Total complications : 30 cases (41%)
Associated cardiac lesions : aortic-valve disease, 11 cases.

Lewis (1933), Bramwell (1947), Campbell and Suzman (1947), Newman (1948), and Shapiro (1949) reported 94 cases of coarctation, of which 27 were fatal. The average age at death from cardiovascular causes was 33, and only 7 had passed their 40th year when last seen.

CAUSES OF DEATH

The causes of death are documented in the necropsies reported by Abbott (1928) and Reifenstein et al. (1947): about 25% of patients died from aortic rupture or aortic dissection; 25% from bacterial endo-aortitis or endocarditis; 25% from congestive heart-failure; about 10% from cerebral vascular accidents; and 15% from other causes. The highest average age at death from cardiovascular causes was 39.

Campbell and Baylis (1956) reported 16 deaths in 130 patients followed for an average period of five years: 7 patients died during or after operation; and the remaining 9 patients did not come to operation. 6 of the patients who died were apparently in good health and died suddenly and unexpectedly, mostly in the third decade.

Cleland et al. (1956) reported 52 patients, of whom 40 came to resection. Of the 12 unresected patients 4 died; 2 from heart-failure due to associated valvular lesions; 1 from subarachnoid hæmorrhage; and 1 from dissection of the aorta. Since that paper was published, Mr. Cleland has treated a further 21 cases by resection. The complications in the total series of 73 patients are listed in table I. Of the 61 resected patients 6 died, 5 of them from local complications (1 did not come to necropsy). Of the 30 patients with complications (whether lethal or not) 26 had complications which involved the aorta and the region of the coarctation.

Local complications are common and hazardous, the more so because many are silent, and sudden death and a shortened life-span are distressingly frequent in coarctation, irrespective of pregnancy.

ASSOCIATED CARDIAC LESIONS AND HEART-FAILURE

Any attempt to assess the hazards of coarctation must take into account the presence of added cardiovascular lesions.

A bicuspid aortic valve was found in about 20% of necropsies by Abbott (1928) and in about 40% by Reifenstein et al. (1947). Aortic regurgitation was present in nearly 25% of the 130 cases of Campbell and Baylis (1956) and tended to become more serious with increasing age. Aortic-valve stenosis was present in 11% of Reifenstein et al.'s series, and in 6 of Campbell and Baylis' patients. Aortic-valve disease was present in 11 of the 73 cases in our own series.

Mitral-valve disease, ventricular septal defect, and patency of the ductus arteriosus are less common.

Cardiac lesions confer the added hazards of bacterial infection and heart-failure. Cleland et al. (1956) found heart-failure only in patients with severe valvular lesions. 18 of 19 patients (Reifenstein et al. 1947) and 7 of 8 patients (Campbell and Baylis 1956) who died of congestive heart-failure had additional cardiac disease. Campbell and Baylis (1956) find that aortic regurgitation with coarctation may lead to heart-failure in the third decade, and they point out that infective endocarditis may accelerate such failure.

HYPERTENSION

Hypertension is rarely severe, and, although systolic pressure may sometimes be high, the pressure is extremely labile. Important hypertensive cardiovascular disease occurs only as an extreme rarity (Cleland et al. 1956). Hypertension may, however, contribute to cerebral vascular catastrophes, and there is some direct relation between intracranial hæmorrhage and the level of the blood-pressure (Reifenstein et al. 1947, Campbell and Baylis 1956). Moreover patients with coarctation tend to have congenital intracranial " berry " aneurysms.

SURGERY

Resection of the coarctation, with or without the use of a graft, is now an established procedure. The mortality is now 5–10%—usually 5% in cases without complications (Campbell and Baylis 1956). Gross (1953) reported only 2 deaths in his last 100 cases. In our series (Cleland et al. 1956), there were 6 deaths in 61 resected cases, including cases complicated by aortic aneurysm. Resection lowers the blood-pressure (Gross 1953, Counihan 1956, Cleland et al. 1956, Campbell and Baylis 1956).

Coarctation with Pregnancy

123 cases of coarctation and pregnancy have been published:

Benham (1949) collected 53 cases from the literature, and Rosenthal (1955) collected 38 more published subsequently and added 5 cases of his own. Porter (1955) added 1 case, Dixon and Hartley (1955) 2 cases, Gropper and Schroeder (1956) 1 case, and Espino Vela and De Castro Abreu (1956) 6 cases. Campbell and Baylis (1956) mention 2 cases in their review of 130 patients with coarctation. Halonen et al. (1956) have published 15 more cases.

To these may be added 13 cases of my own, including the 10 described by Cleland et al. (1956). There is thus a grand total of 136 cases.

MORTALITY

The mortality of pregnancy complicated by coarctation is 9·5% (13 cases). This mortality is in striking contrast to that of 29% in the combined series of 94 cases described by Lewis (1933), Bramwell (1947), Campbell and Suzman (1947), Newman (1948), and Shapiro (1949), and less than that of 12·3% in the 130 cases published by Campbell and Baylis (1956). The ages at death are not comparable in the different series but the average age at death in the combined series of 94 cases was 33. More-

TABLE II—PREGNANCY AND COARCTATION OF AORTA

Cases published by other workers	123
Personal cases	13
Total	136
Mortality connected with pregnancy	13 cases (9·5%)
Cause of death in 13 fatal cases :	
Rupture of aorta	3 cases
Rupture of dissecting aneurysm	3 cases
Cerebral vascular accident	2 cases
Infective endocarditis on aortic valve	1 case
Unknown	1 case
Congestive heart-failure	2 cases
Pulmonary œdema	1 case
	13
Associated cardiac defects in 13 fatal cases	8 cases

(The 2 patients who died of congestive heart-failure and the 1 who died of infective endocarditis had cardiac lesions in addition to coarctation).
Mortality related to total pregnancies : 13 cases in 354 pregnancies (3·4%).

over, 7 of the patients of Campbell and Baylis (1956) died after operation and therefore cannot strictly be admitted to the analysis. Nevertheless, the mortality-rate of coarctation in pregnancy probably does not exceed that of coarctation alone (table II).

In assessing the hazards of pregnancy it is important to know also the mortality-rate in terms of the total number of pregnancies. There were 13 deaths in 354 pregnancies (mortality 3·7%). Many patients had multiple pregnancies without mishap, but it must be admitted that 7 of the 13 patients died in their first pregnancy. Of the remaining 6 patients, 2 died in their second pregnancy and 1 each in the third, fifth, sixth, and ninth pregnancies. None of our 13 patients died (table III).

TABLE III—PERSONAL SERIES OF PATIENTS WITH PREGNANCY AND COARCTATION OF AORTA

Patients pregnant	13
Deaths	0
Patients with multiple pregnancies	12
Patients resected	10
Patients pregnant before resection	9
Patients pregnant after resection	2
Pregnancy terminated (2nd pregnancy, for aortic incompetence)	1

CAUSES OF DEATH

The normal hazards of coarctation are to be expected in addition to those of pregnancy. The causes of death are listed in table II, which shows that the two commonest single causes were aortic rupture and aortic aneurysm. As in previously published series, heart-failure was found only when cardiac lesions were present. There were 3 such cases: 2 of congestive heart-failure and 1 of pulmonary œdema. In patients without cardiac lesions the deaths were due to rupture of the aorta and cerebral vascular accidents.

Let us now consider whether pregnancy predisposes to these hazards of coarctation.

Rupture of the Aorta

Aneurysm and aortic rupture are almost always due to medial necrosis of the aorta, but occasionally to infective endocarditis (Campbell and Baylis 1956). A rise in blood-pressure might predispose to rupture; but, as Reifenstein et al. (1947) pointed out, the blood pressure is not especially high in those cases in which aortic rupture occurs. Wide fluctuations in blood-pressure have been suggested as a precipitating cause of dissection in patients with malignant hypertension receiving hypotensive drugs (Beaven and Murphy 1956), and the blood-pressure is notably labile in coarctation, though probably not more so during pregnancy (Dixon and Hartley 1955). Other factors in pregnancy have also been suggested—e.g., thyroid deficiency (Joule 1949) and hyperlipæmia (Schnitker and Bayer 1944).

Schnitker and Bayer (1944) reported that 24 of 49 females dying from dissecting aneurysm of the aorta (without coarctation) were, or had recently been, pregnant. No proof, however, of the significance of any of these factors is forthcoming, and most authors have emphasised the importance of a rise in blood-pressure in pregnancy and labour causing the aortic wall to burst.

Infection at the site of the coarctation may lead to an aneurysm, as in 1 of our patients. Moreover vegetations may remain unsuspected upon the coarctation for a long time (Cleland et al. 1956) and might cause serious disruption of the aortic wall before detection. It is not known, however, whether pregnancy predisposes to such infection.

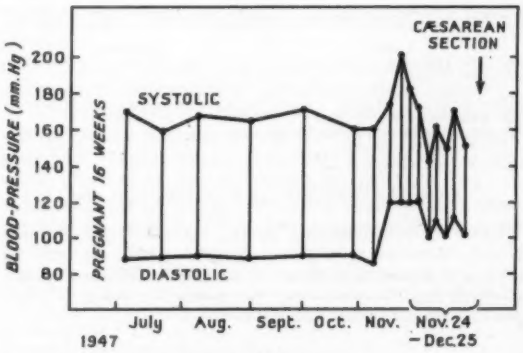

Fig. 1—Blood-pressure during first pregnancy of a patient aged 23 years with coarctation of the aorta.

Hypertension in Pregnancy

It has been often assumed that, in coarctation, the blood-pressure rises in pregnancy and labour. If it does, the risks of aortic rupture and intracranial aneurysm may certainly be increased; but Dixon and Hartley (1955) found, with coarctation, in 2 pregnant patients that the blood-pressure behaved as in normal pregnancy, falling in the middle trimester and rising towards the end of pregnancy, except that the rise was not so high as it may be in the later months of normal pregnancy: in the three labours studied the blood-pressure did not rise appreciably above its upper level before pregnancy. Pritchard (1953) found the same in 2 pregnancies and labours.

In two pregnancies in 1 of our patients the blood-pressure showed the same tendency as that reported by Dixon and Hartley (1955):

> The patient, aged 23, was first seen when sixteen weeks pregnant with her first child. Her blood-pressure remained stable throughout the greater part of pregnancy, the diastolic pressure remaining below 90 mm. Hg. It rose temporarily to 200/115 mm. Hg shortly before term but fell again before cæsarean section was done (fig. 1). In her second pregnancy her blood-pressure fell steadily and gradually and did not rise before term (fig. 2). Two years later her systolic pressure was higher than at any time during her pregnancies except for the temporary rise before her first cæsarean section.
>
> At no time in either pregnancy was her systolic pressure higher than was usual for her when not pregnant.

These observations, the absence of evidence suggesting a tendency to medial necrosis of the aorta in pregnancy, and the similarity of the mortality-rates of coarctation with and without pregnancy suggest that pregnancy does not

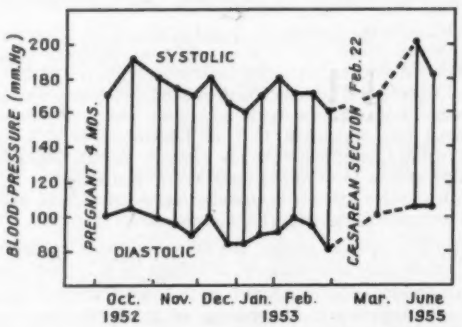

Fig. 2—Blood-pressures during and after second pregnancy of same patient as in fig 1.

confer an added risk to patients with uncomplicated coarctation.

Coarctation Complicated by Heart-disease

The presence of added heart-disease may radically alter the picture of coarctation, because the hazards of heart-failure and bacterial endocarditis are added. The rarity of heart-failure in adults in the absence of cardiac lesions indicates the importance of heart-disease. In pregnancy cardiac lesions assume an even greater importance. Of the 13 patients who died 8 had cardiac lesions; 3 of these died from heart-failure and 1 from infective endocarditis on an abnormal aortic valve. Appreciable valvular lesions are likely to increase in severity with the years, notably aortic regurgitation (Campbell and Baylis 1956).

It is not possible accurately to compare the risks of coarctation with added cardiac disease in the pregnant and in the non-pregnant, but it seems reasonable to suppose that the risks are likely to be greater in pregnancy. Certainly the hazard of heart-failure, which is most unusual in uncomplicated cases, is added to those of aortic rupture, infection, and cerebral vascular accident.

Of our own series of 13 pregnant patients, only 1 had important associated valvular disease—namely, aortic incompetence. For this reason her second pregnancy was terminated in the third month, and subsequently the coarctation was resected.

Management of Pregnancy

Views on management have varied widely:

Mendelson (1940) advised therapeutic abortion early in pregnancy and cæsarean section and sterilisation at term if the pregnancy is far advanced when the coarctation is detected.

Benham (1949) advised cæsarean section at term to avoid an increase in blood-pressure during vaginal delivery.

Pritchard (1953), however, analysed the maternal fatality-rate in the light of the type of delivery and found that it was almost identical in both cæsarean section and vaginal delivery (7·1% for cæsarean, 6·5% for vaginal). He advised vaginal delivery with a short second stage.

Dixon and Hartley (1955), in the light of their observations on the blood-pressure during delivery, were of the same opinion.

All writers lay stress on careful antenatal supervision, adequate rest if cardiac symptoms supervene, and prophylaxis against bacterial infection. No attempt has previously been made, however, to separate patients with important cardiac lesions from those without, and this point seems to be fundamental to the understanding of correct management.

COARCTATION WITHOUT ADDED HEART-DISEASE

It is now our view (Cleland et al. 1956) and that of others (Gross 1953, Campbell and Baylis 1956) that resection should be undertaken prophylactically in young persons. Early recognition and surgical correction of coarctation should therefore in the future reduce the problems of the management of pregnancy. Nevertheless patients with unrelieved coarctation will continue to become pregnant. It is doubtful, from published and personal experience, whether the hazards of uncomplicated coarctation are really increased by pregnancy, and it can be argued that the risks run in pregnancy are not greater than in the non-pregnant state, especially as the blood-pressure tends to fall rather than to rise during pregnancy and normal labour.

I therefore suggest that patients with uncomplicated coarctation should be allowed to go to term, and be delivered by the vaginal route, with a shortened second stage. Very careful watch must be kept during pregnancy for signs of aortic infection and of aortic aneurysm. Any increase in size of the aorta, unexplained pain in the chest or back, or pyrexia, will indicate the necessity for further investigation, including blood-cultures, so that, if an aortic aneurysm threatens to form, resection can be advised. Successful resection during pregnancy has been reported by Peterson et al. (1953), Miller and Falor (1952), and Tebow et al. (1954).

If resection is not required during pregnancy it should be advised at a suitable time after delivery. After resection further pregnancies can probably be contemplated without anxiety. Miller and Falor (1952) and Pritchard (1953) reported successful pregnancies after resection of coarctation, and 2 of our 13 patients were delivered successfully after resection.

If infective endocarditis occurs during pregnancy, a full course of chemotherapy, followed by resection, is indicated. If the pregnancy is less than twenty weeks old, termination may be advisable, but each case must be judged on its own merits. If an aortic aneurysm is suspected, resection should be done at once under full chemotherapy.

COARCTATION WITH HEART-DISEASE

When serious heart-disease is present—and especially if there is appreciable cardiac enlargement, which is very unusual in uncomplicated coarctation—a much more serious view must be taken. It is of the greatest importance to make the diagnosis early, so that the pregnancy can be terminated before the twentieth week. If the pregnancy has progressed further, the management should be that of any patient with heart-disease in pregnancy, except that resection of the coarctation may still be considered.

Considerable difficulty may be experienced in diagnosing slight degrees of aortic-valve stenosis due to a bicuspid aortic valve, since ejection systolic murmurs are invariably present in coarctation, may be exaggerated in pregnancy, and may closely resemble those of aortic stenosis. However, slight degrees of aortic stenosis are probably not important hæmodynamically, although they constitute an added hazard from infection. These difficulties underline the importance of very careful cardiological assessment early in pregnancy, and of consultation between cardiologist and obstetrician to plan management of the pregnancy and delivery.

It is not necessarily true that all cases have "at least moderate cardiac disease" (Pritchard 1953). Patients who have reputedly developed heart-failure in pregnancy have probably had appreciable disease of the aortic valve or other cardiac lesions previously unsuspected.

If pregnancy must be terminated because of added cardiac disease, sterilisation should not be carried out unless it is certain that neither the cardiac lesion nor the coarctation is amenable to future surgical correction.

Summary

The hazards of coarctation and the results of surgical treatment are briefly reviewed. The added risks of pregnancy are assessed in the light of personal experience and that of other workers. The behaviour of the blood-pressure during pregnancy in patients with coarctation is discussed.

Pregnancy is not necessarily an added hazard to the patient with coarctation, provided that complications are not present and that serious cardiac disease does not coexist.

It is suggested that pregnancy be allowed to continue in uncomplicated cases, very careful watch being kept for the onset of complications at the site of the coarctation, which would indicate the need for resection during pregnancy.

In cases with appreciable heart-disease the pregnancy should be terminated at an early stage.

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MANIPULATION IN THE MANAGEMENT OF CHRONIC LOW BACKACHE DUE TO "LUMBOSACRAL STRAIN"

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A REVIEW of cases of chronic low backache seen in the orthopædic department of the Middlesex Hospital in recent years has shown that a very high proportion have been classified as "lumbosacral strain".

The term "lumbosacral strain" is not an ideal one, but in our present state of ignorance regarding the exact pathology of such cases it is concise and useful for classification. The general pathological concept is that of a chronic localised disc degeneration, usually at the L5–S1 level, with associated derangement of the corresponding posterior joints and ligaments, from which pain presumably arises.

In the early stages of the lesion the condition of the posterior joints is essentially a subluxation or "instability", with associated ligamentous strain, but in the later stages a true osteoarthritis, the outcome of long-standing mechanical derangement, develops and can be clearly demonstrated by oblique radiographs of the lumbosacral spine.

The ætiology may well vary from case to case. In some there seems to be an insidious primary degeneration of the disc, whereas in others a traumatic incident may be the cause of the damage (Newman 1952). However that may be, these cases form a fairly typical clinical group of large dimensions. Cases presenting evidence of nerve-root involvement or of generalised lumbar spondylosis are excluded from this group.

It is our belief that, in the great majority of such patients, excluding the very few in whom symptoms are sufficiently disabling to warrant consideration of lumbosacral fusion, the long-term management lies in teaching them to "live with their back," with suitable adjustment of activities and posture. With an intelligent patient, reassurance and advice along these lines may be all that is required, but the average hospital patient, sent for the advice of a "specialist", expects something more positive in the way of treatment.

Of the many forms of active palliative treatment possible, "manipulation" is undoubtedly the most convincing to the patient. Indeed, if it is not offered many will subsequently seek advice elsewhere. In view, however, of the numbers involved and the fact that we are dealing with what is usually no more than a "nuisance disease", any hospital treatment should be as far as possible "definitive", so that clinic and physiotherapy department do not become inundated with these cases.

The object of this investigation was an essentially practical one—to discover whether manipulation of the lumbar spine under general anæsthesia gives a sufficiently high proportion of immediate satisfactory results in this type of case to justify its routine use, with the narrow twin objectives of giving the patient a "good start" in carrying out the general regime suggested above and of providing an avenue of early disposal of these cases from the orthopædic clinic as "satisfied customers".

Clinical Material

The early results of manipulation in 250 consecutive cases diagnosed as lumbosacral strain, in which manipulation was done as the primary treatment, were analysed. There were 84 males (average age 39) and 166 females (average age 36) of whom 116 were married and 50 single.

Routine Management

"Orthopædic" manipulation of the lumbar spine was done under general anæsthesia with complete relaxation. This was followed by an average period of two weeks' physiotherapy, to instruct the patient in simple spinal exercises and in correct posture and techniques of lifting and bending. All the patients were treated as outpatients.

Assessment of Results

Physical signs are few or absent, and therefore assessment must be largely subjective. The following classification was used, based essentially on the patient's own report at the first visit following treatment :

Group I, "cured" : complete dramatic relief of all back symptoms.

Group II, "improved" :

(1) Much improved, to a degree where the patient felt that no further active treatment was required, although some residual symptoms persisted.

(2) Some improvement, but symptoms still present which the patient considered significant, progressing to group (1) after further physiotherapy.

(3) As in group (2) but adequate comfort attained only by wearing a lumbosacral corset.

Group III, "no change" :

(1) Not helped by manipulation or any further treatment.

(2) Subsequently reporting benefit from the provision of a lumbosacral corset.

Group IV, "worse" :

(1) Made worse by manipulation and not helped by any further treatment.

(2) Subsequently reporting benefit from the provision of a lumbosacral corset.

The results obtained were as follows :

Group	No. of cases	
I	25 (10·0%)	
II (1)	136 (54·4%)	(86·8%)
II (2)	20 (8·0%)	
II (3)	36 (14·4%)	
III (1)	6 (2·4%)	
III (2)	18 (7·2%)	(13·2%)
IV (1)	4 (1·6%)	
IV (2)	5 (2·0%)	

Discussion

Although the primary aim was to assess the practical value of manipulation in the management of "lumbosacral strain", the composition of the group of 250 cases studied is of some interest. The ratio (1 to 1·8) of males to females confirms the clinical impression that this type of backache is more common in females than in males. Were externally applied strain an important ætiological factor, one would expect the condition to be more common in males.

Two possible predisposing factors in the female immediately come to mind : the greater lumbosacral angle, which would increase the shearing strain on this region, and the possible effects of pregnancy and childbearing. The latter possibility has not been studied in detail, but the ratio of 2·3 to 1 of married to single women does not suggest that childbearing has been an important ætiological factor in this series, in view of the normal ratio of married to single women in the age-group under consideration.

There is no more controversial treatment in the management of backache than "manipulation". Opinions vary sharply from those of the "osteopathically" inclined, who would have us believe that virtually all backache can be cured with certainty by manipulation, often involving very specialised manœuvres, to those who hold that manipulation has no place in the reputable management of backache in orthopædic practice. The latter are wont to attribute any success of the former to psychological influences. Although this possibility cannot be completely ruled out, the patients in this series were not subjected to any psychological pressure. In other words, no effort has been made to "sell" manipulation as a certain cure for all their ills. Manipulation was done by different operators working on anæsthetised patients. The technique of manipulation was that of general orthopædic manipulation of the lumbar spine, aiming to put the lumbar spine through a complete range of movement. It is therefore reasonable to assume that the results obtained are in some way due to the physical manœuvre of manipulation and therefore capable of general repetition.

Although only 10% of the patients were dramatically "cured", it was possible to discharge 64·4% (group I plus group IIa) at the first clinic visit after manipulation as "satisfied customers". In this group both our objectives have been achieved. A further 22·4%, however, reported some improvement ; hence manipulation was worth while from the patient's point of view in 86·8% of cases. In only 3·6% was any harm done, inasmuch as the patient felt worse after the manipulation, and in 9·6% the manœuvre was a waste of time for all concerned.

23% of the patients were ultimately fitted with a lumbosacral corset, and it might well be argued that this might have been more expeditiously applied as the primary management. Unfortunately a review of the material has not revealed any common factor which might be assessed before manipulation to forecast the likely result. The ratio of males to females in all groups closely paralleled the ratios of the totals. The state of the pathological process, judged clinically and radiographically, did not prove any guide to the likely subjective improvement following manipulation ; nor did any particular age-group respond especially well.

We may conclude that manipulation of the lumbar spine under general anæsthesia, although entirely empirical, produced results in this group of patients which go far towards fulfilling the aims set out above for the active palliative treatment of "lumbosacral strain" in hospital practice. Manipulation provides one satisfactory practical means of managing this ever-present problem in the orthopædic clinic.

Summary

Long-term relief in cases of "lumbosacral strain" depends mainly on the patient's ability to adjust posture and activities to the limitations of the spine.

Manipulation under general anæsthesia gives a sufficiently high proportion of immediate satisfactory results to justify its routine use as a palliative measure in the hospital management of such cases.

I wish to thank Mr. Philip Wiles and Mr. Philip Newman, under whose care these patients were, for permission to publish this material and for help and advice in the preparation of this paper.

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SURGERY DURING LONG-TERM TREATMENT WITH ADRENOCORTICAL HORMONES

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ALTHOUGH the place of the adrenocortical hormones in the treatment of rheumatoid arthritis remains controversial, they are now often used in the long-term management of this and other diseases. It is inevitable that, on occasion during such treatment, indications will arise for surgical treatment of the primary or some intercurrent disease. There still appears to be a widespread belief that administration of adrenocortical hormones adversely affects healing and resistance to infection. It is the experience of this unit, however, that the administration of moderate doses of these hormones adds no danger to the operation concerned and carries no additional risk of complications. Our findings agree with many recent reports that most surgical wounds heal normally during continuous treatment with adrenocortical hormones.

Material

We have records of 19 patients who have undergone thirty-six surgical operations while under treatment with adrenocortical hormones. We are not concerned here with the indications for treatment with these hormones or with side-effects other than those bearing on the response to surgery. The accompanying table gives the details. The cases are divided into groups according to whether the operation was elective or emergency, and clean or septic. Since 9 of the 19 patients had more than one operation, we have numbered both the patients and their operations.

All the patients had chronic rheumatoid arthritis except case 2 (ankylosing spondylitis), case 3 (disseminated lupus erythematosus), case 18 (polyarteritis nodosa), and case 12 (breast cancer).

Dosage

Immediately before operation all the patients were receiving oral cortisone or an analogue or corticotrophin sufficient to suppress at least partly the symptoms of their

disease. The preparations given are listed in the table in the order in which they were used, the one being taken at the time of operation being the last mentioned. Steroid therapy was continued over the period of operation in all but 1 case, and it has been our routine to give additional cortisone to patients receiving this drug or an analogue. The table shows that most of the operations for which no additional cortisone was given were minor. The precise schedule of this additional dosage varied somewhat; usually, for operations not involving the gastrointestinal tract, 75–100 mg. of cortisone acetate was given intramuscularly twenty-four hours and one hour preoperatively, or a single injection of 150 mg. an hour preoperatively, oral administration being continued until the time of operation and resumed as soon as possible afterwards. For partial gastrectomy 100–150 mg. of cortisone was given intramuscularly twenty-four hours and one hour preoperatively and a further 100 mg. twelve hours postoperatively: intramuscular administration was continued for the next three days, with a daily dosage of 100, 100, and 75 mg., and oral administration was resumed on the fourth postoperative day.

No dosage has been listed for the 7 patients receiving corticotrophin, because the variation in strength between the batches of corticotrophin at present available and the individual variation in responsiveness make the nominal dosage meaningless. All these patients, however, showed clinical evidence of suppression of their disease, and all 5 patients in whom the urinary excretion of 17-hydroxycorticosteroids (Appleby et al. 1955) was estimated showed evidence of adrenal stimulation; corticotrophin was continued over the operation, but no additional dose was given. The management of patients receiving corticotrophin is discussed below.

Complications

In twenty-six of the thirty-six operations the postoperative course and wound healing were normal. Cases 5, 6 (operation 1), and 8 (operation 2) developed slight superficial wound infections, which responded rapidly to treatment and did not significantly affect healing, and case 9 had a hæmatoma.

Serious complications occurred in cases 3, 13, and 14 (see below).

Discussion

Side-effects

Some of the earlier published reports (Ragan et al. 1949, Baker and Whitaker 1950, Baxter et al. 1951) emphasised the possibility of side-effects of corticosteroid therapy. Among these several are important in surgery, notably defective healing of wounds and bone, impaired resistance to infection, modification of the clinical picture of the acute surgical condition, and suppression of normal pituitary-adrenal responses.

These reports were based on experiments on animals given a relatively large dosage. They have undoubtedly

OPERATIONS UNDER TREATMENT WITH ADRENOCORTICAL HORMONES

Case no.	Operation no.	Sex	Age (yr.)	Nature of operation	Form and duration of steroid therapy before operation	Daily † dosage at time of operation (mg.)	Additional hormone over operation	Operative or postoperative complications
Elective "clean" operations:								
1	1	M	38	Excision of nodule from knee-joint	Cortisone 11 mos.	75·0	Yes	Nil
	2			Excision of nodule from knee-joint	,, 12 mos.	75·0	Yes	Nil
	4			Gastrojejunostomy	,, 30 mos.	50·0	Yes	Nil
2	1	M	47	Cup arthroplasty of hip	,, 20 mos.	75·0	Yes	Nil
	2			Cup arthroplasty of hip	,, 22 mos.	75·0	Yes	Nil
3	1	F	55	Pinning of fractured neck of femur	Corticotrophin 8 mos.	†	†	Non-union
	2			Removal of pin	,, 11 mos.	†	†	Delayed healing of wound
	3			Excision of head of femur	,, 11 mos. Prednisone 2 mos.	15·0	Yes	Delayed healing (anæmia)
4	1	F	32	Arthrodesis of wrist	Cortisone 19 mos.	75·0	No	Nil
	2			Excision of head of radius	,, 31 mos.	75·0	Yes	Nil
	3			Arthrodesis of wrist	,, 41 mos.	62·5	Yes	Nil
5		F	37	Bilateral hallux valgus operation	,, 42 mos.	62·5	Yes	Small stitch abscess
6	1	F	58	Partial gastrectomy	,, 30 mos. Hydrocortisone 4 mos.	70·0	Yes	Slight superficial wound infection
	2			Arthrodesis of knee	Cortisone 30 mos. Hydrocortisone 30 mos.	75·0	Yes	Nil
7	1	F	48	Excision of encysted hæmatoma of calf	,, 20 mos.	60·0	No	Nil
	2			Excision of encysted hæmatoma of calf	,, 32 mos. Prednisone 14 mos.	20·0	Yes	Nil
8	1	F	45	Dilatation and curettage	Cortisone 6 mos.	62·5	Yes	Nil
	2			Hysterectomy	,, 6 mos. Hydrocortisone 5 mos.	60·0	Yes	Slight superficial wound infection
9		F	55	Laparotomy for adenocarcinoma of ovary	Cortisone 15 mos. Corticotrophin 15 mos.	†	†	Hæmatoma of wound
10		F	42	Cæsarean section	,, 57 mos.	†	†	Nil
11	2	F	43	Partial gastrectomy	Prednisone 19 mos.	20·0	Yes	Nil
12		F	41	Simple mastectomy	Prednisolone 5 mos.	17·5	No	Nil
Emergency "clean" operations:								
1	3	M	38	Suture of perforated duodenal ulcer	Cortisone 15 mos.	75·0	No*	Nil
6	3	F	58	Strangulated femoral hernia	,, 2 wks.	75·0	No	Nil
8	3	F	45	Partial gastrectomy for hæmatemesis	,, 6 mos. Hydrocortisone 6 mos.	60·0	Yes	Nil
11	1	F	43	Suture of perforated gastric ulcer	Prednisone 15 mos.	20·0	Yes	Nil
13		M	35	Partial gastrectomy for hæmatemesis	Cortisone 34 mos. Hydrocortisone 14 mos.	60·0	Yes	Died 24 hr. post-op.
14	1	M	46	Partial gastrectomy for hæmatemesis	Corticotrophin 48 mos.	†	†	Burst abdomen
	2			Reclosure of wound	,, 48 mos.	†	†	Died 24 hr. post-op.
15		M	53	Suture of perforated gastric ulcer	,, 47 mos.	†	†	Nil
16		M	55	Strangulated inguinal hernia	Cortisone 18 mos.	75·0	No	Nil
Elective septic operations:								
17		M	42	Antrostomy	Corticotrophin 18 mos.	†	†	Nil
18		M	48	Mastoidectomy	Cortisone 30 mos. Prednisone 7 mos.	25·0	Yes	Nil
11	3	F	43	Multiple dental extractions	,, 11 mos.	20·0	No	Nil
	4			Multiple dental extractions	,, 11 mos.	20·0	No	Nil
Emergency septic operation:								
19		F	37	Drainage of orbital abscess	Corticotrophin 10 mos.	†	†	Nil

* Cortisone was stopped on day of operation and for several weeks afterwards
† For dosage in cases treated with corticotrophin: see text.

influenced the attitude of many surgeons towards operating during treatment with adrenocortical hormones, although it was also shown that, if doses of the order usually given therapeutically were administered to animals, there was little evidence of these side-effects (Cole et al. 1951). Some aspects of our own experience are discussed here in the light of these experimental findings.

Healing

Thorn et al. (1954) state that serious interference with wound healing is rare unless the dosage is large (more than 150 mg. of cortisone daily) and prolonged and protein intake inadequate.

Wound healing was normal in 17 of our 19 patients ; the 2 exceptions were receiving corticotrophin and showed evidence of excessive adrenal stimulation at the time of operation :

Case 3.—At the time of her first operation for pinning of spontaneously fractured neck of femur the patient presented many of the features of Cushing's syndrome, and her daily excretion of 17-hydroxycorticosteroids was high ; in spite of this her wound healed normally, although the fracture did not unite. When the pin was removed nine weeks later, she showed less evidence of hyperadrenalism, but wound healing was delayed. Healing was again delayed after her third operation, when prednisolone 15 mg. daily had been substituted for the corticotrophin, but she was found to be anæmic, and, once the anæmia had been corrected, healing was rapid ; the slow healing after the second operation was also probably due partly to anæmia.

Case 14 had a burst abdomen four days after partial gastrectomy. His mean urinary excretion of 17-hydroxycorticosteroids over this period was 40 mg. daily, and it is therefore likely that the defective wound healing was related to the excessive production of corticosteroids.

Operations on bone were followed by normal healing in all except case 3. Three arthrodeses and a bilateral cup arthroplasty of the hip-joints were completely successful, and clinical and radiological evidence of sound union was obtained within the expected time.

Individual variation in susceptibility to the various effects of the hormones appears to be considerable. One can judge more accurately whether healing is likely to be delayed by inspection of the patient than by consideration of the dosage of hormones given. This clinical approach can be reduced to simple terms :

(1) Patients who appear normal will heal normally.

(2) Patients who show the features of Cushing's syndrome may heal badly.

(3) Patients who have definite rounding of the face but only slight other side-effects will probably heal normally, unless

(4) they also have anæmia, severe wasting, or gross abnormality of the plasma-protein levels, when they may heal badly.

Surgery in Peptic Ulceration

It is generally agreed that the incidence of peptic ulcers increases in patients receiving adrenocortical hormones orally, and that the risks of perforation and of hæmorrhage are also somewhat increased. However, it has been reported that ulcers healed with medical treatment although the administration of adrenocortical hormones was continued (Bollet et al. 1955), and we also have observed this.

In our experience surgical treatment can equally well be undertaken while treatment with adrenocortical hormones is continued, with confidence that healing of intestinal anastomoses will be normal.

4 of our patients underwent operations for chronic peptic ulceration (partial gastrectomy 3 cases ; vagotomy and gastroenterostomy 1 case) ; in all the cases the postoperative course was uneventful and recovery rapid. The end-results of these operations were uniformly satisfactory, and adrenocortical hormone treatment has been continued successfully.

6 other patients required emergency surgery for complications : 3 for perforation and 3 for hæmatemesis. Cases 1, 11, and 15 all had the classical symptoms and signs of acute perforated peptic ulcer ; none was much shocked, all were operated on early, and all made rapid recoveries, though 2 later had to have more radical surgery.

3 patients had massive bleeding : case 8 recovered quickly and well from emergency partial gastrectomy ; but cases 13 and 14 died. Both the patients who died presented gross clinical evidence of hormone overdosage, whereas case 8 did not. Case 13 appeared to be in good general condition despite massive and repeated hæmorrhage, and he might have been saved if he had been operated on before he became severely shocked.

Case 14 died from a succession of gastrointestinal hæmorrhages caused by widespread oozing from a thin friable mucosa. For many days, in spite of almost continual hæmorrhage, his general condition seemed good ; any patient not receiving adrenocortical hormones who endured such a severe series of hæmorrhages would probably have appeared more ill and would have been submitted to surgery sooner than this patient was. As it happened, little could be done surgically to arrest the bleeding.

Although these patients presented the classical signs of perforation or of hæmorrhage, their general appearance belied the severity of the condition ; this may lead to dangerous delay in undertaking appropriate surgical treatment. We therefore suggest that surgery should be considered earlier for patients under treatment with corticosteroids than the usual criteria would indicate.

Surgery and Bacterial Infection

The earlier views of the dangers of corticosteroid therapy in the presence of infection have been considerably revised. It is now accepted practice to use the hormones in combination with antibiotics in treating certain infections. There is still reluctance to operate on an infected focus while these hormones are being given; but in 5 instances where operation was done in a septic field no unusual measures were needed, and resolution was rapid and uneventful.

Case 18 had suppurative otitis media which repeated courses of antibiotics did not cure. Operation was delayed for several weeks because the patient was receiving prednisolone, but after radical mastoidectomy the discharge ceased and the wound healed quickly by first intention.

Case 17 had chronic suppurative maxillary sinusitis which had resisted repeated lavage. Bilateral nasal antrostomy led to rapid resolution although treatment with corticotrophin was continued, and the infection has not recurred ten months after operation.

Case 19 had severe orbital cellulitis with suppuration. Drainage of the abscess, penicillin, and anticoagulants led to complete recovery within three weeks ; treatment with corticotrophin was not interrupted.

Case 11 had extensive dental caries and pyorrhœa. Dental clearance was done in two stages under penicillin cover, and healing was rapid and complete. At this time she was receiving prednisone 20 mg. daily.

Pituitary-adrenocortical Suppression

Acute stress, such as a surgical operation, in some way stimulates secretion of corticotrophin by the pituitary gland, and this in turn leads to increased secretion of adrenocortical hormones. But therapeutic administration of these hormones inhibits the normal mechanism ; and, after such treatment has been discontinued, pituitary and adrenocortical functions remain impaired for days and occasionally many months (Salassa et al. 1953b). During this period the response to stress is subnormal, and any severe stress may cause death from acute adrenocortical insufficiency. Death or severe shock from this cause has been reported by Fraser et al. (1952), Salassa et al. (1953a), Lundy (1953), Robinson et al. (1953), Harnagel and Kramer (1955), Downs and Cooper (1955), Richman et al. (1956), Hayes and Kushlan (1956), Allanby (1957), and Slaney and Brooke (1957).

It is therefore imperative that the administration of adrenocortical hormones be continued throughout the operation and postoperative period. If the operation is more than minor, a larger dosage of hormones must be given to allow for the increased requirement which the patient's own pituitary-adrenal system will not supply. This additional dosage can conveniently be given in the form of one or two intramuscular

injections of cortisone, because absorption by this route is slow, and the maximal effect may not be reached before twelve hours. For the same reason intramuscular cortisone alone cannot be relied on for the treatment of acute adrenocortical insufficiency during or after operation; should this arise, hydrocortisone in addition should be administered intravenously by continuous drip.

The management of patients receiving corticotrophin is more difficult. The great variation in individual response and in the potency of different preparations and batches of corticotrophin makes any system of nominal dosage meaningless. Treatment can be controlled satisfactorily only if the urinary excretion of 17-hydroxycorticosteroids is measured regularly, as an index of the amount of adrenal stimulation. Our practice has been to continue giving corticotrophin over the period of operation and to base any alteration of dosage on the daily excretion of 17-hydroxycorticosteroids. As with the patients having oral hormones, hydrocortisone can be given intravenously if signs of acute adrenocortical insufficiency develop.

Conclusions

Operations during long-term treatment with adrenocortical hormones carry no increased risk of complications, provided that there are no gross signs of overdosage with the hormones, and the administration of the hormones is not interrupted.

Summary

Thirty-six operations done during treatment with either adrenocortical hormones or corticotrophin are reviewed.

Wound healing was uneventful after thirty-three of these operations.

Bone repair was normal apart from non-union of a fractured neck of a femur.

2 patients died and 1 recovered after gastrectomy for gastrointestinal hæmorrhage.

Three elective operations for peptic ulceration and three emergency operations for perforation were uneventful.

Five operations in the presence of sepsis were uneventful.

Postoperative complications were insignificant.

Except in 1 case hormone treatment was continued throughout the operation and postoperative period.

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LABORATORY DIAGNOSIS OF CONGENITAL GALACTOSÆMIA AT BIRTH

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HITHERTO the incapacity of some infants to metabolise galactose normally has not been discovered until signs and symptoms of galactosæmia have been produced by ingestion of milk. The clinical syndrome, which is probably due to disturbance of normal carbohydrate metabolism consequent on an accumulation of galactose-1-phosphate in the tissues (Schwarz, Golberg, Komrower, and Holzel 1956) could be avoided if the child's abnormality were recognised before any milk was given.

We report here a method of recognising the abnormality soon after birth. The test is made on cord blood, and thus involves no risk or inconvenience to the baby. The reagents and equipment used are readily available in hospital laboratories.

Principle

The method is based on the observation that incubation of galactosæmic erythrocytes with galactose leads to accumulation of galactose-1-phosphate in the cells. The amount of galactose-1-phosphate which accumulates in normal erythrocytes in such circumstances is much smaller.

The erythrocytes are incubated first with galactose and then with glucose; the free sugar is washed out with saline solution; after removal of protein the total organic and inorganic phosphates are precipitated as barium salts, and the galactose- and glucose-1-phosphates are selectively hydrolysed to free galactose and glucose. These sugars are then separated chromatographically, and the amount of galactose is estimated by comparison with known quantities chromatographed simultaneously.

Method

Heparinised cord blood, within 1–2 hours of collection, is introduced in a siliconed graduated 15 ml. centrifuge tube up to the 2 ml. mark. Another sample is taken for determination of the hæmatocrit. A solution of 2% galactose in saline solution (0·02 ml.) is added, the tube is stoppered, and the contents are mixed. The blood is incubated at 37°C for 2 hours with occasional mixing. Ice-cold saline solution is then added to about 12 ml. and, after mixing, the cells are spun down at medium speed, and the supernatant fluid is removed. The washing is repeated twice with 12 ml. of saline. The cells are then reincubated with occasional mixing for 2 hours at 37°C with 0·1 ml. of 2% glucose in saline and enough saline to give a volume of 2 ml. The cells are washed three times with 12 ml. of saline to remove free glucose.

The cells are lysed by shaking with 2 vols. of water containing a little saponin, and freezing. Ice-cold 20% trichloracetic acid (3 vols.) is added, and the mixture is kept in ice for 6 minutes with occasional hard shaking. After the mixture has been centrifuged in ice-cold buckets for 2 minutes, its total volume is recorded, and it is poured through a sintered-glass filter. To the filtrate, whose volume is measured, 2 drops of 25% barium acetate is added, followed by a slight excess of 40% NaOH (phenolphthalein being used as the indicator). It is important to carry out these last operations quickly and to keep the mixture cold while the pH is acid, since the galactose-1-phosphate is readily hydrolysed in acid solution. The phosphates are precipitated quantitatively by the addition of 4 vols. of ethanol and by being kept in the refrigerator at least one hour (or overnight).

The precipitate is spun down, the supernatant removed, and the precipitate washed once with 5 ml. of neutralised ethanol. After addition of 1·5 ml. of water the precipitate is broken up with a glass rod, and the mixture is neutralised to phenolphthalein with *N* HCl and then made 0·1 *N* acid by the addition of 0·1 vol. of *N* HCl. The phosphates are hydrolysed by immersion of the mixture in boiling water for 7 minutes.

After cooling, about 0·5 ml. of water is added, followed by a slight excess of *N* H_2SO_4 to precipitate the barium. The mixture is neutralised with 2*N* NH_4OH and centrifuged. The supernatant fluid is transferred to a small evaporating-cup, made by cutting off a test-tube of 1·5 cm. diameter about 2 cm. from the bottom. The precipitate is washed twice with 0·2 ml. of water, and the washings are transferred to the cup. The solution, which contains the free galactose and glucose derived from easily hydrolysable phosphates, together with some other components, as well as ammonium sulphate and chloride, is evaporated to dryness in a vacuum desiccator over $CaCl_2$.

The dry residue is allowed to absorb some moisture from the atmosphere to facilitate grinding. This is done with a small glass rod with an enlarged rounded end in the presence of 0·1 ml. of pyridine, which extracts the free sugars. After thorough grinding, the "slurry" is transferred with a pasteur pipette to a hæmatocrit tube. The residue in the cup is ground twice, with each time 0·06 ml. of pyridine, to complete the extraction and to transfer the "slurry" to the tube. After the contents have been mixed by shaking up and down the tube several times, the solids are sedimented by sharp centrifugation for 4 or 5 minutes.

The height of the liquid column, excluding the sediment, is noted, and half is transferred with a capillary tube to the starting-line of a descending chromatogram. This is run on a sheet of no. 4 Whatman paper, 58 cm. long, with a 10 cm. long folded strip of paper stapled to the bottom. Known amounts of galactose (5, 10, 20, and 30 μg.) are placed alongside the sample. Without prior equilibration the chromatogram is run overnight in *n*-butanol/pyridine/water (30/20/15 by vol.) (Jeanes et al. 1951). After drying in a current of cold air the chromatogram is dipped in freshly prepared benzidine reagent (0·5 g. of decolorised benzidine in 5 ml. of glacial acetic acid, 20 ml. of acetone, 4 ml. of 100% trichloracetic acid, and acetone to 100 ml., added in that order) (Harris and MacWilliam 1954). The chromatogram is heated for 2–4 minutes in an oven at 100°C until the paper begins to turn pale yellow.

The amount of galactose in the sample is estimated visually by comparison with the known amounts, either in daylight or in ultra-violet rays, in which the spots exhibit a bright greenish yellow fluorescence. From this the amount of galactose accumulating in 1 ml. cells per 2 hours is calculated.

The complete test can be carried out in 2–3 days but requires relatively little attention.

Results

The cord blood of 18 normal babies and the venous blood of 2 babies with galactosæmia were examined by this method, with the following result:

Normal blood: (mean) 3·5 μg. of galactose per c.cm. of red cells, (range 0·7–9·8).
Galactosæmic blood: case 1 58 μg. of galactose per c.cm. of red cells.
case 2 76 μg. of galactose per c.cm. of red cells.

Diagnosis of Galactosæmia in a Newborn

The cord blood of case 3, sib to case 2, was examined by the method described above. In addition, a sample of this blood, without incubation with galactose, was analysed for galactose-1-phosphate to find out whether any galactose had accumulated in utero. The results were:

Galactose-incubated blood	108 μg. (±12)	of galactose	per c.cm.
Unincubated blood	35 μg.	,,	,,
Hence accumulation of galactose-1-phosphate during incubation.	73 μg.	,,	,,

On the basis of this test a diagnosis of galactosæmia was made on the third day of life, in the absence of any clinical symptoms. The baby, initially fed on glucose-saline solution, was put on the milk-free diet described by Holzel (1954); she weighs 11 lb. 10 oz. at the age of 17 weeks and is developing normally.

Discussion

We have shown previously (Komrower, Schwarz, Holzel, and Golberg 1956) that a galactose-tolerance test may not be without danger to an infant suffering from congenital galactosæmia. The laboratory test described here enables a diagnosis to be made without recourse to the galactose-tolerance test and in the absence of any clinical symptoms and signs of the disease, thus eliminating the possibility of interference in the physical and mental development due to the injurious effect of galactose.

Obviously, the test cannot be applied to all newborn infants, so as to detect the sporadic case of galactosæmia; but it could be applied to every newborn infant with a family history suggestive of the disease.

The margin between the behaviour of normal and galactosæmic erythrocytes is wide and should enable a firm diagnosis to be made on the basis of the described test.

Our experience with case 3 shows that galactose-1-phosphate may accumulate in the tissues in utero, in spite of some restriction of milk intake by the mother during gestation. No galactose was detected in the mother's venous blood on two occasions after the consumption of a pint of milk. At parturition no galactose was found in the liquor amnii (less than 0·04 mg. per 100 ml.). We do not know whether the relatively small amount of galactose-1-phosphate present in the erythrocytes at birth is matched by a similar concentration in other tissues, but it is not unlikely that the liver may contain more. Nor can we say at this stage whether such small concentrations are injurious.

It is hoped that the institution of a milk-free diet from birth, as made possible by the new test, will prove to be of real benefit.

We have found the new test, in a slightly modified form, useful for establishing the diagnosis of untreated cases. (The modification consists in omitting the incubation of the cells with glucose or galactose.) Thus a four-week-old baby, presenting with the usual symptoms, was found to have 210 μg. galactose per c.cm. of red cells in the form of galactose-1-phosphate. Since this phosphate disappears only very slowly from the cells, the diagnosis can be made even in the absence of galactose from the blood and urine.

Summary

A diagnosis of congenital galactosæmia can be made, within 2–3 days of birth, by a test performed on cord blood. The infant can be given, from the first, a galactose-free diet and can thus be saved from the damaging effect of extraneous galactose.

The test is useful for establishing the diagnosis of untreated cases.

A case is described in which the diagnosis was made in this way in a newborn infant. Her erythrocytes contained galactose-1-phosphate at birth, which showed that some galactose had entered the tissues in utero, though it had not been detectable in the mother's blood.

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TORSION OF THE STOMACH
AS A CAUSE OF VOMITING IN INFANCY

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ALTHOUGH an organic cause is evident in many cases of vomiting in infancy, many infants are still recorded as having neuropathic or habitual vomiting.

From radiological examination of such patients we noticed for the first time, about five or six years ago, a characteristic shape and position of the stomach in some of the cases. Since then we have found these characteristics with increasing frequency, and up to May 1, 1957, we had diagnosed this condition in 54 children (34 boys and 20 girls), ranging in age from one day to three years.

The radiological findings are strikingly alike in all cases. The body of the stomach is raised, with the greater curvature as the highest point and the lesser curvature as the lowest. The posterior wall of the stomach points forward, and the pyloric antrum and pylorus with the duodenal bulb are directed more or less straight down. The middle part of the transverse colon is interposed between the liver and the anterior abdominal wall and comes above and in front of the stomach, often even just under the diaphragm. The following cases are illustrated in fig. 1 :

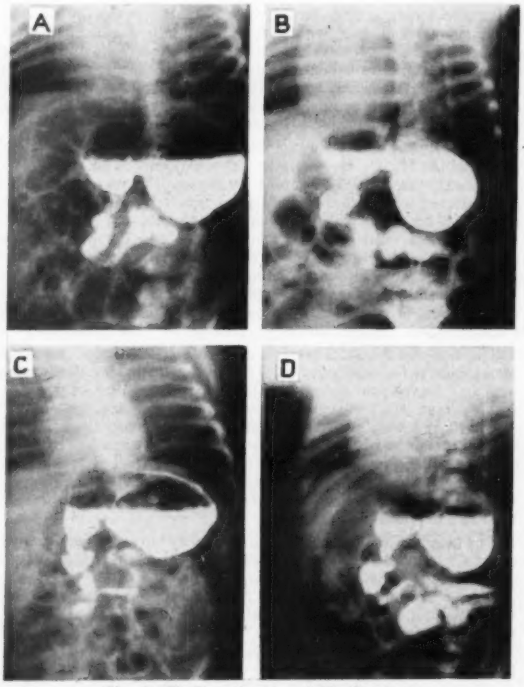

Fig. 1—Findings in cases A–D. See text.

CASE A.—A girl, aged 6 weeks, with vomiting after feeds from the age of 2 weeks, never projectile. Gained weight. Immediate improvement when she was placed on her right side.

CASE B.—A boy, aged $2^1/_2$ months, had from the age of 2 days uncharacteristic vomiting after practically all feeds. Unsatisfactory gain of weight. Vomiting ceased when he was placed on his right side.

CASE C.—A boy, aged 4 weeks, had daily projectile vomiting from first day of life. Gained weight. Immediate improvement when he was placed on his right side.

CASE D.—A girl, aged 3 weeks, had projectile vomiting from first day of life. Loss of weight. Immediate improvement when she was placed either prone or on her right side.

Causation

Normally the stomach is fixed at two points—the cardia and the pylorus. At the cardia it is fixed by the upper part of the hepatogastric ligament and by the gastrosplenic ligament. At the pylorus the duodenum is fixed behind the peritoneum. The rest of the stomach is suspended freely by the hepatogastric ligament. The transverse colon is normally suspended below the greater curvature of the stomach by the thin and short gastrocolic ligament.

In infants the lower thoracic aperture is relatively open and the liver easily mobile. In the supine position the anterior edge of the liver descends,

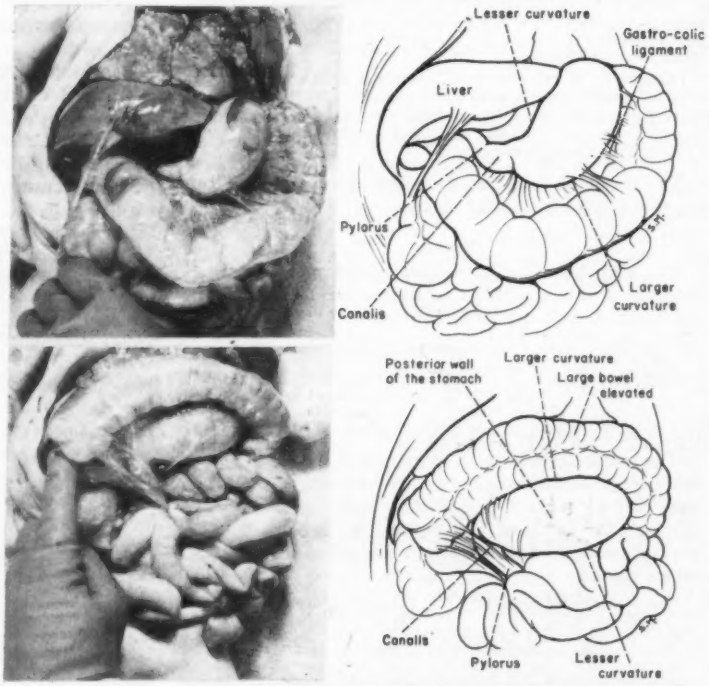

Fig. 2—Artificial rotation of stomach post mortem.

Above: stomach and transverse colon in normal position but inflated with air. Below: air-filled transverse colon placed above and in front of stomach, rotating stomach through 180° and bringing posterior wall of stomach to point forwards, with greater curvature as highest point and lesser curvature as lowest point. Pyloric antrum and pylorus with duodenal bulb is directed straight downwards exactly as in radiographs (fig. 1).

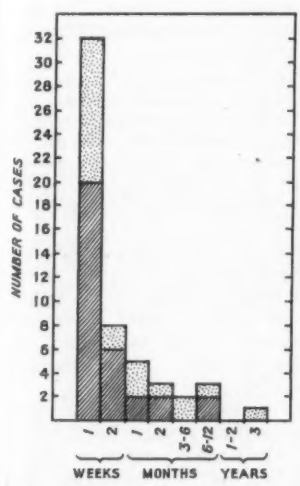

Fig. 3—Age-incidence of onset of symptoms. Hatched histograms, projectile vomiting.

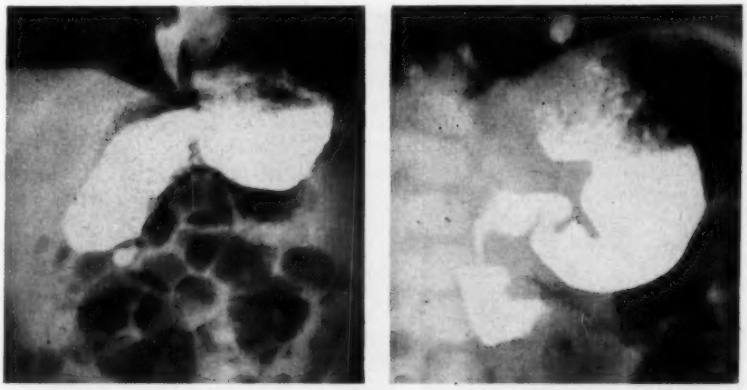

Fig. 5—Stomach untwisted by holding baby head down. Left: before. Right: after.

and a space may open between the liver and the anterior abdominal wall, into which a gas-filled transverse colon may easily rise. In these circumstances the transverse colon pulls the stomach and twists it on its longitudinal axis with the cardia and pylorus as fixed points.

This mechanism of twisting can be reproduced post mortem (fig. 2). In our experience this twisting has never been more than 180° and it can be less. The twisting may delay gastric emptying, interfere with peristalsis, and perhaps also disturb the circulation of the blood in the stomach.

Symptoms

Vomiting beginning soon after birth is the main symptom (fig. 3). Vomiting is often observed in the very first days after birth, but it may also begin later. Our eldest patient was 3 years old. The symptoms often start as gulps which increase to vomiting. More than half the patients were observed to have projectile vomiting.

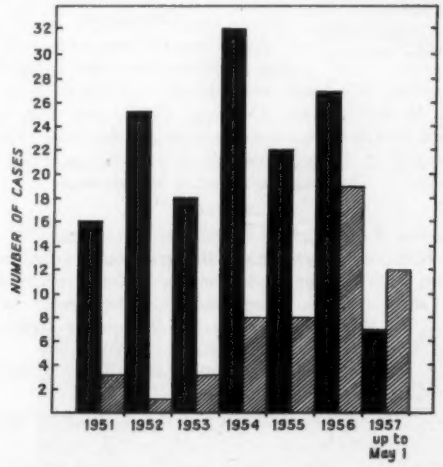

Fig. 4—Incidence of twisting of stomach (hatched) and of congenital pyloric stenosis (black).

Vomiting did not always occur immediately after feeding; its force and frequency varied, but usually it occurred daily. Of the 54 patients 18 gained weight satisfactorily in spite of daily vomiting, 21 gained little or no weight, and 15 lost weight.

Patients with twisting of the stomach usually do not present so serious a clinical picture as infants with congenital pyloric stenosis ; but it is often impossible to distinguish clinically between the two conditions. In twisting of the stomach a pyloric tumour, of course, cannot be palpated. Of the 54 patients 43 had vomiting as the only symptom: in the remaining 11 the child was admitted to hospital for some other condition such as eczema, congenital heart-disease, epilepsy, or cerebral palsy.

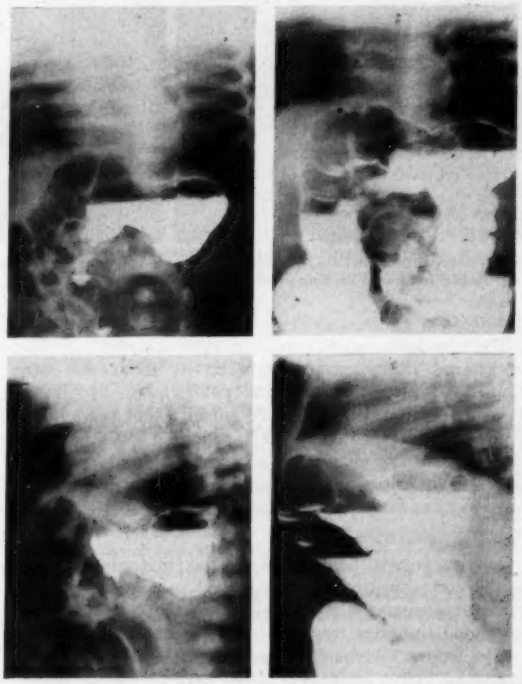

Fig. 6—Unsuccessful attempt to untwist stomach by loading transverse colon with barium in a boy, aged 7 weeks. Left: before. Right: after. Above: left anterior oblique. Below: left lateral.

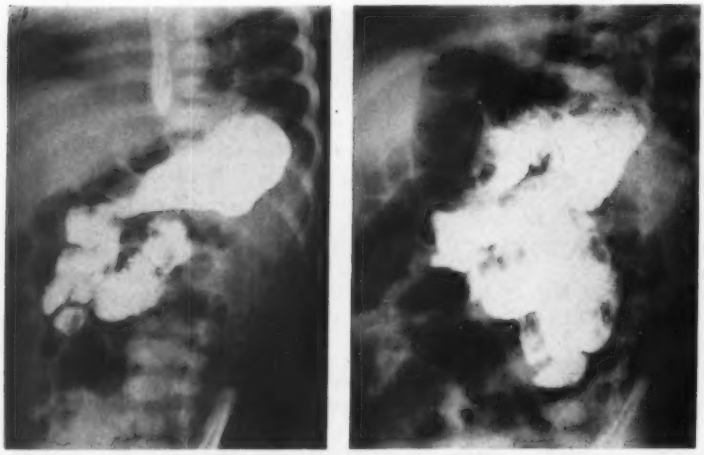

Fig. 7—Twisting of stomach produced by inflation of transverse colon per rectum in a boy, aged 7 weeks, with increasing vomiting since age of 3 weeks.

No projectile vomiting. Unsatisfactory gain of weight. Immediate improvement when boy was placed on his right side. Left: stomach approximately in normal position before inflation of colon. Right: after inflation radiograph shows typical twisted stomach with transverse colon above it.

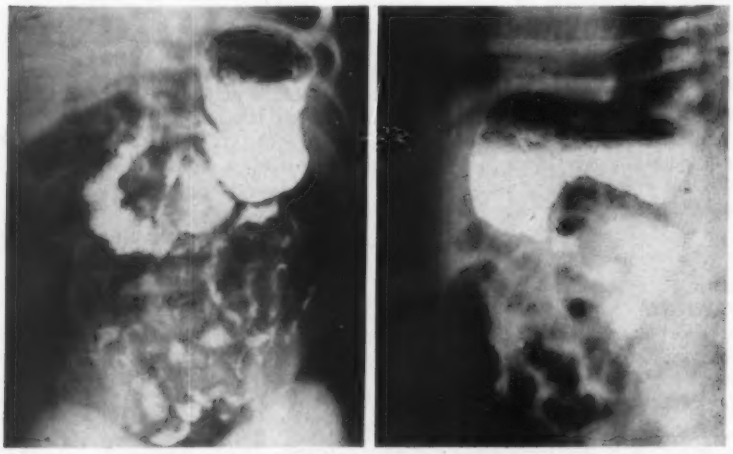

Fig. 8—Intermittent twisting of stomach in a girl, aged 1 week, with vomiting from birth. Left: stomach normal in shape and position. Right: typical twisted stomach three days later.

Incidence

The condition is not rare. In 1956 and the first four months of 1957 it was diagnosed in about the same number of cases as congenital pyloric stenosis (fig. 4). The greater number of cases found in recent years is due to the care with which we have sought it. We have not accepted clinical diagnoses such as habitual vomiting, nervous vomiting, and rumination, and every case of vomiting has been radiologically examined.

X-ray Examination

Torsion is best displayed when the patient is examined in the erect position. He is placed in a special cotton garment, suspended by four straps, which at the same time hold the head erect.

The degree of twisting depends on the position of the transverse colon. As stated, it has never exceeded 180°.

We have tried to untwist the stomach by holding the patient head down to induce the transverse colon to move towards the pelvis. This has only rarely been successful, as in the following case:

CASE E.—A boy, aged 6 weeks, had vomited from the age of 2 weeks. No projectile vomiting. Satisfactory gain of weight. Did not vomit when placed on his right side. Typical radiograph. When he was held head down, the stomach regained a normal position (fig. 5).

We have also tried to untwist the stomach by filling the colon with barium, hoping that the weight of the barium might bring the transverse colon back into its normal position. These attempts failed (fig. 6).

In one case in which torsion was suspected the stomach appeared to be in its normal position on radiography, but we confirmed the diagnosis by inflating the transverse colon per rectum and thus twisting the stomach (fig. 7). This goes to show that torsion of the stomach may sometimes be intermittent; therefore normal appearances on radiography are not conclusive, and the typical shape and position of the twisted stomach may be found at a subsequent examination (fig. 8).

Treatment

The treatment is very simple. The patient should be placed prone, with the upper part of his body lowered, or alternatively merely placed on his right side. Usually vomiting will cease immediately or become noticeably less. In a few cases the vomiting may continue for some time. In no case has it been necessary to untwist the stomach surgically.

Comment

Since we became interested in this condition we have diligently tried to find references to it. Torsion of the stomach in adults is well known (Dalgaard 1952), but the only mention of it in infants appears to be by Roviralta (1949), who called it "la plicature de la grande courbure de l'estomac". He made no mention of the cause.

Summary

Torsion of the stomach is common in infants.

A collection of gas raises the transverse colon to a position between the liver and the anterior abdominal wall; and the colon, being attached to the greater curvature of the stomach through the gastrocolic ligament, twists the stomach forwards and upwards.

The chief symptom is vomiting, sometimes projectile, and usually beginning soon after birth.

Treatment is simple: the baby is placed either prone or on its right side.

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Roviralta, E. (1949) *Helv. pædiat. acta*, **4**, 445.

A NOTE ON THE RELATION OF APPETITE TO EXERCISE

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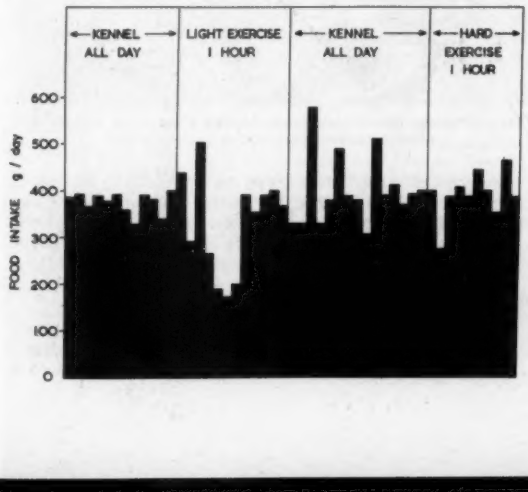
MEDICAL writers often discount the value of exercise in the treatment of obesity, because it is alleged that the extra physical activity will promote appetite, and the energy value of the extra food consumed will be the same as, or even more than, the energy value of the exercise. There is, of course, no doubt that in physically active persons appetite balances, with remarkable precision, the energy values of the food eaten and the work performed. But this may not be so in sedentary people.

Mayer et al. (1954) showed that when rats were made to walk on a treadmill for periods ranging from 1 to 6 hours daily, food intake was related to the duration of exercise and their weight was maintained constant. If, however, exercise was restricted to less than an hour, there was no corresponding fall in food intake. Indeed, more, not less food was eaten, and the animals gained weight. I have long thought about ways and means of repeating this elegant experiment on man, but the psychological difficulties appear insuperable. Recently, however, an opportunity arose to repeat their observation on a dog, which had become moderately obese during a period when it was kept in the animal-house and had free access to a liberal mixed diet.

This dog was put on a diet consisting of equal parts of brown bread and a proprietary preparation of dog meat, minced together. A weighed amount of food was put in the kennel each day at about noon, and removed as soon as the dog had finished eating. The residue of food was then weighed. This regime was continued for 49 days.

During days 1–12 and 25–39 the dog remained in the kennel throughout. On days 13–24 it had an hour's light exercise (walking on a treadmill on the level at 3·5 m.p.h.); and on days 40–49 it had an hour's hard exercise (walking on a treadmill at 3·5 m.p.h. up an incline of 1 in 10). The dog readily accomplished this and was not exhausted at the end.

The figure shows that on some days when light exercise was taken the food intake was reduced, and that throughout the period of hard exercise, it was the same as in the two sedentary periods. Average daily food consumption was 378 g. during the first sedentary period, 331 g. during the period of light exercise, 396 g. during the second sedentary period, and 391 g. during the period of hard exercise.



There was a slight loss of weight during the sedentary periods (attributable perhaps to the limited access to food) but this loss was increased by the exercise, and over the whole period the weight fell from 25·0 to 22·6 kg. The dog was very fit at the end of the studies.

In this animal, clearly, a short period of exercise did not increase the appetite above the sedentary level. The result is thus in line with the study of Mayer et al., and supports their suggestion that a certain minimal level of physical activity is necessary for the appetite to function with precision and to adjust food intake to requirements.

If this hypothesis can be substantiated in man, it has great practical importance in the treatment of obesity. It is not generally realised how sedentary is the life led by most urban people. Even young military cadets spend $17^{3}/_{4}$ hours a day either lying, sitting, or standing (Edholm et al. 1955); the corresponding figure for coalminers is $18^{3}/_{4}$ hours a day and for colliery clerks 20 hours a day (Garry et al. 1955). Military cadets and miners have two of the most physically active occupations, and yet about three-quarters of their life is sedentary. The daily physical activity of many thousands of light workers (and housewives may be so defined—see Durnin et al. 1957) may be below the threshold needed for appetite to function normally. For this reason they may overeat and become obese. If this is so, then perhaps the first duty of their physician is to prescribe a suitable regime of physical activities.

I am indebted to the Medical Research Council for an expense grant.

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Preliminary Communication

AN ANTIBODY TO CASTLE'S INTRINSIC FACTOR

WE have succeeded in producing antibodies to preparations of human and pig intrinsic factor (I.F.) as the initial part of a scheme to demonstrate the site of secretion of I.F.

Three antigens have been used. One was made from human gastric mucosa (substance E of O'Brien, Taylor, Turnbull, and Witts [1]) and the other two were partially purified preparations of pig pylorus, designated I.F. 1345 and I.F. II B2. In each case the antigen was dissolved in water and emulsified with a light paraffin oil, 'Bayol F' (Esso Standard Oil Co.), containing killed human *Mycobacterium tuberculosis*, and an emulsifying agent, 'Arlacel A' (Atlas Power Co., Wilmington, U.S.A.). Rabbits were injected with one of the three mixtures by multiple subcutaneous puncture. This Freund adjuvant technique [2] was used because it is known to give high titres of antibody, which persist for long periods.

Simple precipitation tests, using all three antigens and antisera, gave heavy precipitates from interaction of the human I.F. and the corresponding antiserum. Both pig preparations and their corresponding antisera behaved similarly. There was also some cross-reaction between I.F. 1345 and the rabbit anti-human-I.F. serum. Results with the Ouchterlony

1. O'Brien, J. R. P., Taylor, W. H., Turnbull, A. L., Witts, L. J. *Lancet*, 1955, i, 847.
2. Freund, J., McDermott, K. *Proc. Soc. exp. Biol., N.Y.* 1942, **49**, 548.

INHIBITION OF INTRINSIC-FACTOR ACTIVITY BY ANTISERA

Patient no.	Preparation given	Percentage absorbed of 0·5 μg. dose of ^{60}Co-labelled vitamin B_{12}
1	Vitamin B_{12} alone	5·2
	" " with 20 mg. I.F. II B2	44·4
	" " with 20 mg. I.F. II B2 + 20 ml. normal rabbit serum	47·7
	" " with 30 mg. I.F. II B2 + 20 ml. anti-pig-I.F. serum:	
	(*a*) supernatant	21·2
	(*b*) precipitate	7·2
2	Vitamin B_{12} alone	12·6
	" " with 20 mg. I.F. II B2 + 20 ml. normal rabbit serum	55·9
	" " with 20 mg. I.F. II B2 + 20 ml. anti-I.F. serum:	
	(*a*) supernatant	0·0
	(*b*) precipitate	9·8
3	Vitamin B_{12} alone	18·0
	" " with 10 mg. I.F. II B2	52·1
	" " with 20 mg. I.F. II B2 + 20 ml. normal rabbit serum	63·5
	" " with 20 mg. I.F. II B2 + 20 ml. anti-pig-I.F. serum:	
	(*a*) supernatant	5·8
	(*b*) precipitate	37·3
4	Vitamin B_{12} alone	27·3
	" " with 26 mg. substance E	60·4
	" " with 26 mg. substance E + 20 ml. anti-human-I.F. rabbit serum	2·9
5	Vitamin B_{12} alone	26·6
	" " with 26 mg. substance E + 20 ml. normal rabbit serum	39·3
	" " with 26 mg. substance E + 20 ml. anti-pig-I.F. rabbit serum	0·0

technique,[3] in which solutions of the antigen and antiserum are allowed to diffuse towards each other from cups cut in 1% agar in petri dishes, have suggested that in the case of I.F. 1345 the antigen consisted of more than one constituent. Substance E gave only one band with its antiserum, but this was a very weak one and cannot be taken as conclusive evidence of homogeneity.

None of the antigens used was pure I.F., and the only means of determining whether antibody to I.F. was present in the antisera was by specific neutralisation of I.F. activity.

I.F. activity was estimated by the fæcal excretion method of Heinle et al.[4] in patients with pernicious anæmia controlled by treatment. Amounts of I.F. known to possess demonstrable activity were dissolved in water and mixed with antiserum in the proportions suggested by previous precipitation tests. The mixture, or the precipitate and supernatant separately, was administered with the test dose of ^{60}Co-labelled vitamin B_{12}. Controls were done in the same manner, using normal rabbit serum. I.F. activity could not be tested in the case of I.F. 1345 by the fæcal excretion method, since it already contained a relatively large amount of vitamin B_{12}.

The results are shown in the table. It can be seen that human and pig I.F. activity can be inhibited by specific rabbit antisera.

Unless some means of splitting the antigen-antibody complexes differentially can be found, serological techniques are not likely to offer a possible method of I.F. purification; but, using the Ouchterlony plate method, they may provide a useful means of testing the homogeneity of I.F. preparations and add to the established criteria of purity.

It is interesting that the rabbit is able to produce an antibody to I.F. It may be that I.F. is essentially an external secretion and causes sensitisation when it is introduced parenterally, or it may be that I.F. is partly or wholly species-specific. Schwartz et al. following up their original observation that patients with pernicious anæmia may become resistant to orally administered I.F.,[5] have recently [6] suggested that this phenomenon may be due to such sensitisation.

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New Inventions

A PLEURAL-BIOPSY PUNCH

THIS instrument enables a biopsy specimen to be taken from the parietal pleura, when an effusion is aspirated, without risk of damage to the lung. It is large enough to take a satisfactory specimen (4 mm. in external diameter) without causing more discomfort than ordinary aspiration under local anæsthesia. Because the biopsy is clean-cut, the histological picture is undistorted.

Fig. 1 shows all the features of the punch except the stylet. It consists essentially of two concentric tubes. The short trocar point is sharp enough to penetrate the chest wall after a tiny incision has been made in the skin, but it does not puncture the lung if the effusion is completely aspirated. Behind the point is a deep notch in the outer tube, which can be closed by twisting the back hexagonal grip clockwise, so sliding the pin on the base of the inner tube along the oblique slot in the base of the outer tube and advancing a sharp-cutting cylinder just past the notch with a rotary movement, thus cutting off and holding any tissue engaged therein. In fig. 1 the notch is seen half-closed. A spring clip holds the pin in either the open or the closed position sufficiently firmly to prevent inadvertent movement.

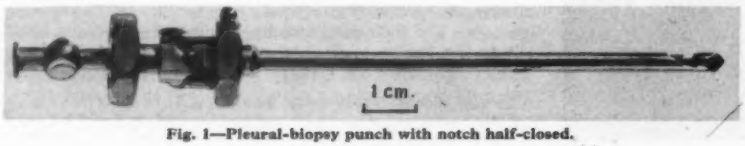

Fig. 1—Pleural-biopsy punch with notch half-closed.

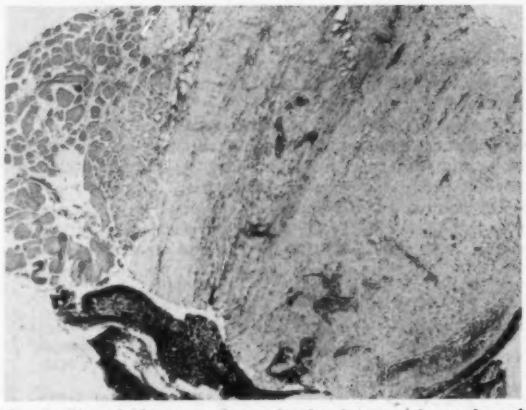

Fig. 2—Pleural biopsy specimen showing intercostal muscle and thickened pleura infiltrated by carcinoma.

Any type of syringe mount may be specified; so the punch can be used with apparatus for routine aspiration. The two tubes can be completely separated for cleaning, and as all the parts are either stainless or heavily plated, they can be sterilised by boiling.

Technique. — The chest wall is infiltrated with local anæsthetic in the usual way, a tiny incision is made in the skin, and the punch is

introduced with the notch closed, in which state it is airtight. The aspiration apparatus is then attached to the mount on the inner tube, the back hexagonal grip is twisted anticlockwise to open the notch, and the aspiration carried out. At the end of aspiration the notch is directed along the intercostal space by means of the indicator knob on the front hexagonal grip, the punch is slowly withdrawn, and sideways pressure in the direction of the notch is maintained until it is felt to engage in the chest wall. The punch is then held firmly against the chest wall, the back hexagonal grip twisted sharply clockwise, and the punch withdrawn. Finger pressure for two or three minutes stops any bleeding from the puncture. The biopsy specimen is found either in the hollow point or inside the cutting cylinder.

I have used the punch mostly as an aid in the diagnosis of pleural effusion of unknown origin in middle-aged patients.

Fig. 2 shows a biopsy specimen from a man, aged 56, who became very breathless in three weeks. A very large yellow pleural effusion was aspirated several times. After complete aspiration radiography of his chest, bronchoscopy and bronchography failed to reveal the cause. Pleural biopsy was done with the next aspiration and showed thickened pleura infiltrated by carcinoma.

I have also used the punch to obtain biopsy specimens from lung tumours in which there was good radiological evidence of adhesion of the lung. The punch will take a biopsy specimen from any tissue into which it is inserted.

Mestitz et al. (1957) have related their experience with this punch, mostly in the diagnosis of tuberculous effusions. In their series there were no serious complications in 116 biopsies. I have had no complications in 30 biopsies.

My thanks are due to Mr. Holmes Sellors for his encouragement; and to all the consultant staff at Harefield Hospital, to Mr. A. L. d'Abreu and Dr. A. Brian Taylor for allowing me to take biopsy specimens from their patients; and to Mr. T. F. Dee for the photographs. The Genito Urinary Manufacturing Company, 28a, Devonshire Street, London, W.1, made the instrument.

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REFERENCE

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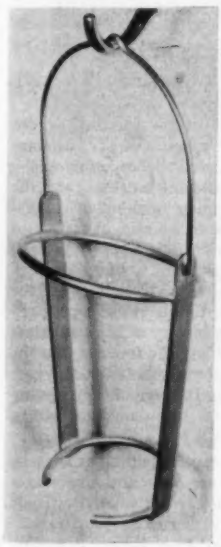
THE BRISTOL TRANSFUSION CRADLE

THIS cradle was designed to make transfusion-bottle changing an easier task; the frail wire clips supplied with transfusion sets are both awkward to fasten and unreliable when used for the second bottle.



The cradle (see figure) contains two rings supported by cross-pieces with a loop for attachment to the transfusion stand. The upper elliptical ring is set at an angle so that, after the upper part of the bottle has been passed through it, the bottle can rotate about a horizontal axis, its neck passing through a gap of $1^{5}/_{8}$ in. in the lower ring.

Cradles of this type have been in constant use for the past eight months and were found to save much labour.

We are indebted to Mr. A. E. Christmas, instrument maker at the Bristol Royal Infirmary, for assisting in the design, and Mr. R. Bennett for making the trial prototypes. The cradle can be obtained from Messrs. Charles F. Thackray Ltd., Park St., Leeds, 1.

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Reviews of Books

Essentials of Chemical Pathology

D. N. BARON, M.D., reader in chemical pathology, Royal Free Hospital School of Medicine, London. London: English Universities Press. 1957. Pp. 247. 25*s*.

IN twenty years the subject of chemical pathology has advanced from a sideline of clinical pathology to a major specialty in its own right, influencing the development of almost every field of medicine. These broad advances have been paralleled by a literature which at present consists mainly of advanced treatises or students' elementary textbooks. Dr. Baron has intended his book to provide medical students, housemen, and registrars with an adequate knowledge of chemical pathology to permit them to keep up to date with this ever-advancing subject.

The first part gives a general account of the normal and abnormal features of fluid and electrolyte distribution and of carbohydrate, fat, and protein metabolism. There follow details of the applications of chemistry to the investigation of various systems. The section on calcium, phosphorus, and bone, and those on water and electrolytes and on acidosis and alkalosis, are exceptionally good, but the kidneys could with advantage have been discussed more fully. The chapter on the steroids is particularly useful, but a clearer account might have been given of the causes of difficulty in assessment of adrenal function. There is a remarkably complete account of differential estimations of serum-proteins; and such up-to-date topics as C-reactive protein, afibrinogenæmia, agammaglobulinæmia and fibrocystic disease are included.

In an introduction, Sir Charles Dodds remarks that the author has refrained from quoting a large number of references; but the book covers so wide a field that many readers would welcome further reference to certain subjects.

This is in no sense a laboratory manual, though some clinical procedures, as well as various methods for routine testing of urine, are described in detail. It is perhaps a pity that Dr. Baron's desire for completeness has led him to describe such out-of-date tests as Hay's test, the urea-concentration test, and the hippuric-acid tests, all of which are of little clinical value. It is high time, too, that osazone and fermentation tests for the identification of glucose were abolished from chemical pathological practice; identification by paper chromatography or enzyme tests is more satisfactory.

The statements that "The bilirubin which is originally produced from hæmoglobin is also called indirect, pre-hepatic or hæmobilirubin. The modified bilirubin which has passed through the liver is called direct, post-hepatic, or chole-bilirubin" do not emphasise the need to drop this terminology. The recent classification of the mechanism of the van den Bergh reaction by Lathe has led to the more logical use of the terms "bilirubin" and "conjugated bilirubin".

The book is perhaps too detailed for general use by the student, but it deserves to be widely read by the many doctors who nowadays seek the help of the laboratory of chemical pathology. At 25*s*. it is one of the best bargains among medical textbooks.

Sigmund Freud: Life and Work

Vol. 3. The Last Phase, 1919-1939. ERNEST JONES, M.D., F.R.C.P. London: Hogarth Press. 1957. Pp. 536. 35*s*.

Dr. Ernest Jones may rest content with his biographical labours. Confronted with the peculiar difficulties that beset a psychoanalyst in this task, he has for the most part put aside the temptation to infer and to interpret. He has given us instead a well-documented and faithful story of the struggles and vicissitudes of Freud's life; it is a good historical account, which might have been written by someone quite incapable of making a subtle psychoanalytical dissection of what lay beneath the surface, in the way that Freud himself did in his essays on Goethe, Dostoevsky, and Leonardo.

Half of the third and concluding volume is devoted to the last twenty years of Freud's life—a period of great physical suffering endured with noble stoicism, and of disappointments and upheavals which he met with unfailing humour and fortitude. His character matched his intellectual power, and few who have read this biography will withhold admiration and respect, however little they may agree with the tenets of psychoanalysis. In the account of this last phase, Freud's daughter Anna shines with a milder light in the background, a devoted and selfless helper. The volume is appropriately dedicated to her.

It is a pity that Dr. Jones has given so much space to personal quarrels, such as that between himself and Rank. It is clear that feuds among his followers distressed Freud and sometimes took up much of his time and thought, but the detailed account of suspicions and misunderstandings makes tedious reading.

The latter half of the book consists of a review of Freud's contribution to a wide range of subjects, including religion, occultism, art, and literature. This is naturally a subjective valuation, crediting Freud's work with a greater and more lasting impact than many who are expert in the respective subjects have been willing to concede. It affords, however, a striking conspectus of the long creative activity of a fertile and very original mind.

Chemotherapy and the Central Nervous System

HENRY MCILWAIN, PH.D., D.SC., professor of biochemistry, University of London, at the Institute of Psychiatry. London: J. & A. Churchill. 1957. Pp. 328. 45*s*.

SINCE the time of Ehrlich the term "chemotherapy" has usually been restricted to chemical treatment which destroys some infecting organism (bacterium or parasite); but by its derivation it ought to include all treatment by chemical compounds. Dr. McIlwain uses the term in the wider sense, and his book considers chemical compounds which have been used to produce all kinds of therapeutic effects in the central nervous system.

His approach is mainly historical, starting from 1800 and leading up to the most recent developments. Thus, successive chapters describe general anæsthetics and hypnotics; antipyretics; the distribution of drugs in the body and their metabolism; the action of drugs on the body and on the disturbing agent; drugs acting on infections (arsenicals and other compounds against trypanosomes and syphilis, sulphonamides, and antibiotics), and the theory of antimetabolites developed from them; anticonvulsant and drugs for the treatment of epilepsy; and drugs for nervous and mental disorders, both those which are mainly excitant (e.g., amphetamine, pipradol) and those which are mainly depressant (e.g., reserpine, chlorpromazine). Finally, there is a chapter which considers the general principles of discovering new drugs for action upon the central nervous system.

The book does not attempt to give technical details or exact data, but rather considers general principles; and the author is to be congratulated on having told a complex story in a simple and intelligible style, which does not need a detailed knowledge of chemistry or pharmacology for its appreciation. He will find ready readers among doctors who are interested in knowing the background of the drugs they use, and among research-workers, pharmacologists, and synthetic chemists engaged in the search for new remedies.

Gynecologic Surgery and Urology

THOMAS L. BALL, M.D., assistant professor of clinical obstetrics and gynecology, Cornell University Medical College. London: Henry Kimpton. 1957. Pp. 547. 150*s*.

BRITISH gynæcologists perhaps do not realise that in many centres in the United States gynæcology and female urology are almost one specialty. Dr. Thomas Ball's beautiful volume of operative gynæcology might well have been entitled Female Pelvic Surgery, since it includes some basic proctology in addition to urology and gynæcology. The reader will be impressed with the accurate anatomy and the thoughtful and meticulous approach of the anatomically trained surgeon to each clinical problem, which is illustrated by some of the finest drawings to be found in any similar book.

The scope is considerable and includes many important problems which are not strictly surgical, such as the psychosomatic aspects of gynæcological surgery, and a particularly thoughtful chapter on backache in women. The general substance of the book is in line with the best modern British gynæcological practice, and the style of the author is clear and, at times, refreshingly racy. The chapter on malignant tumours, radiation, and radical surgery is perhaps the best, and includes some of the more recent advances in radiation therapy.

British gynæcologists should not be deterred by the price of this lavishly produced and generously illustrated book, for by spending it they will broaden their attitude to gynæcology and they will find much to stimulate and instruct them.

The Sea My Surgery

JOSEPH MAGUIRE, M.B. London: William Heinemann. 1957. Pp. 234. 16*s*.

Dr. Maguire has been a ship's doctor for thirty years, and for fifteen of them he has been serving in the *Queen Mary* or the *Queen Elizabeth*. Even the least gifted of writers would find it hard to write a dull book with that sort of experience behind him—and Dr. Maguire is certainly not in that category. He tells his story with all the gift for raconterie which one might expect from an old sailor who is also an Irishman.

To remind us that, even on one of the Queens, a ship's doctor's life is not concerned exclusively with tending film stars with headaches, there are several accounts of more desperate emergencies—sometimes fought out with hundreds of miles separating the doctor and his patient, whose condition had to be diagnosed and treated by radio. One of the most interesting chapters recalls a period when conditions were not so luxurious. Dr. Maguire sailed in the *Queen Elizabeth* throughout the late war, when she was used for trooping. She then carried up to 15,000 soldiers at a time, but in a manner which denied them most of the comforts the peacetime passenger expects. (The better state-rooms on the main deck, for instance, which normally accommodated 2 persons, were reserved for colonels—26 to a room!) There are intriguing glimpses of the organisation which made possible this mass transport of men, and which surmounted such tasks as cooking 31,000 eggs for breakfast.

The Disease of Tobacco Smoking and its Cure

LENNOX JOHNSTON, M.B. London: Christopher Johnson. 1957. Pp. 104. 3*s*. 6*d*.

SMOKING has been shown to be partly responsible for bronchial carcinoma, pulmonary tuberculosis, coronary occlusion, thromboangiitis obliterans, and tobacco amblyopia—not to mention the fires and mine explosions it causes, and the road accidents attributable to cerebral ischæmia due to carboxyhæmoglobinæmia. There is little to be said in favour of smoking, and the world would no doubt be a happier place if it were abandoned. Dr. Johnston has been saying this with some force for years, and he has now written a summary of the evidence against smoking, an account of his alarming experiments on himself with nicotine, and a history of his campaign. We wish him success; but we must unhappily forecast that the tone of his book will incense most smokers rather than convince them of their errors. They may be frightened into giving up their addiction; they will not be persuaded by these methods.

The book may better serve a purpose in helping those who have decided to stop smoking; there are hints and encouragement, and suggestions for forming a stalwart mental attitude against smoking. An appendix gives verbatim the recent statement by the Medical Research Council on tobacco-smoking and cancer of the lung.

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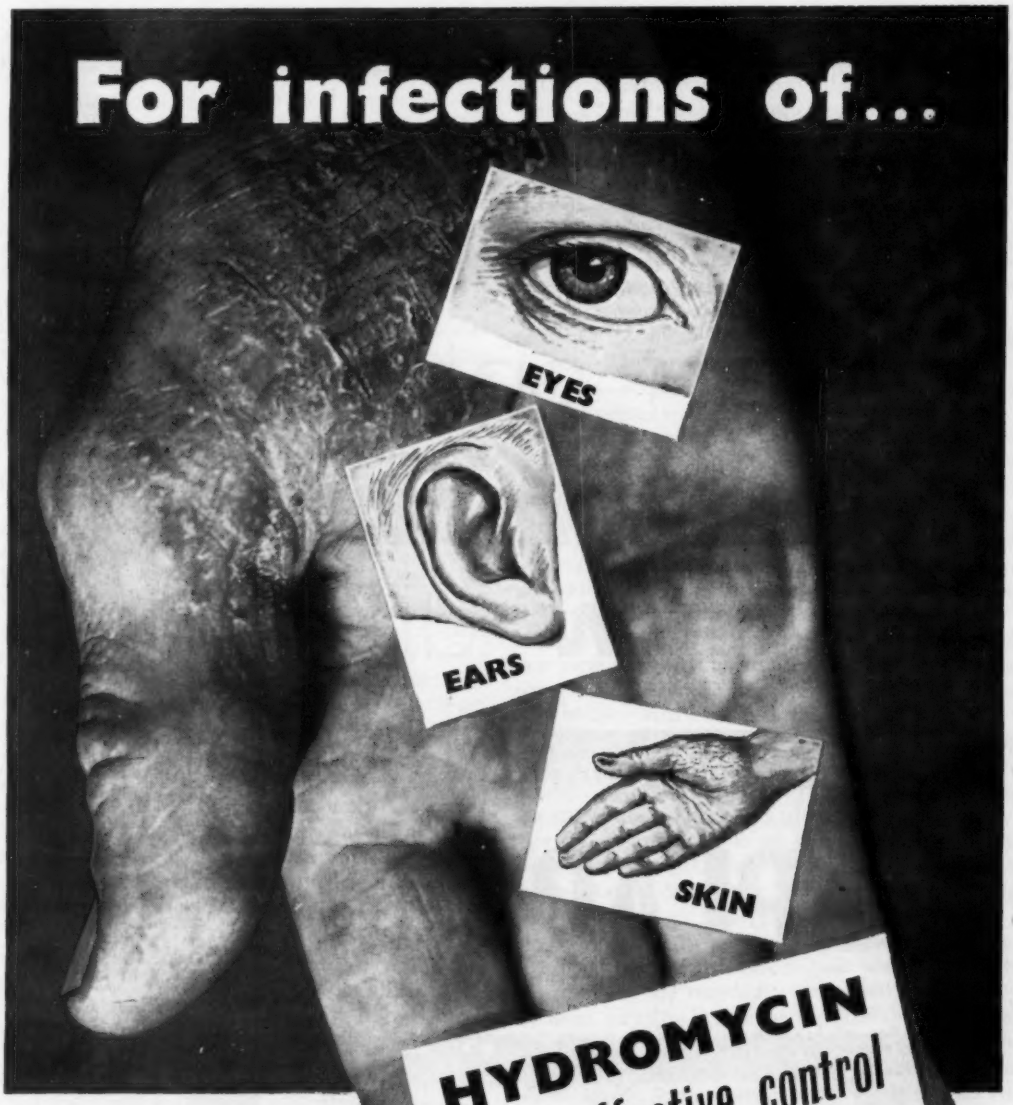

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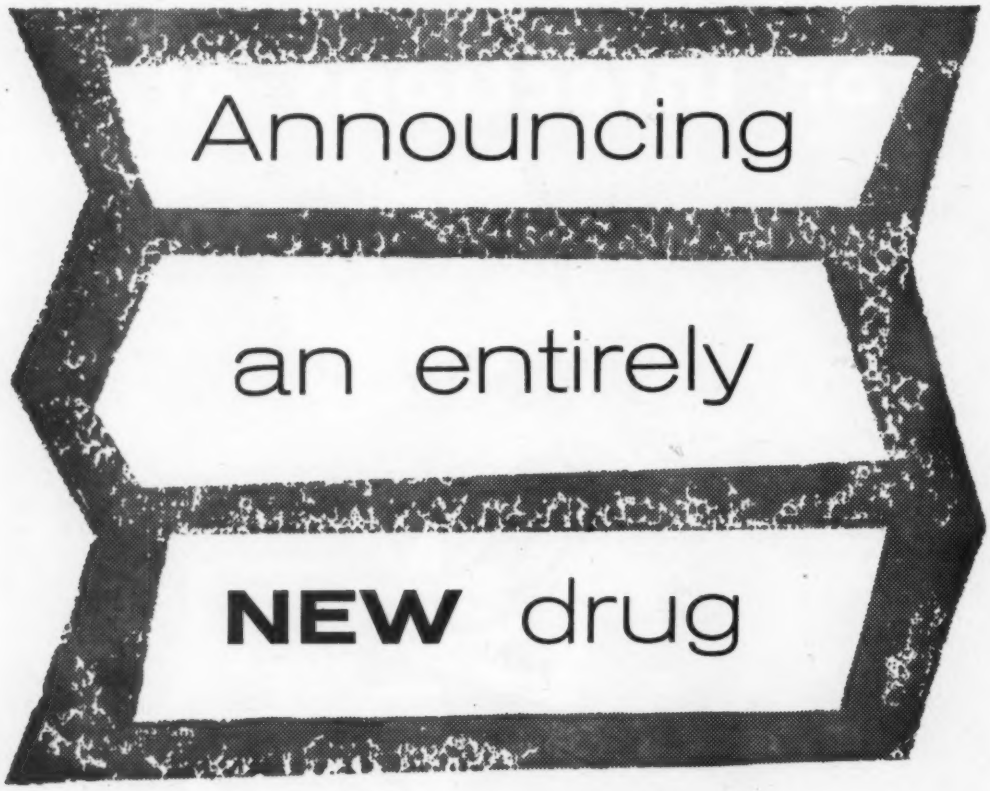

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THE LANCET
LONDON 4 JANUARY 1958

Incidental Dangers of X-ray Therapy

BELIEF in the relative "radioresistance" of certain organs and tissues which may have to be included in therapeutic X-ray fields prevailed for many years. But in the past decade that comfortable conviction has been rudely shaken; and to long-established hazards, such as radiation burns and bone-marrow aplasia, further disquieting possibilities have been added. Major damage to the kidney, to the central nervous system, to the lung, and probably to the heart-muscle must now be included among the risks of radiation.

The clinical and experimental work of Prof. CLIFFORD WILSON and his colleagues, whose report we publish this week, demonstrates that irradiation of the kidney may produce hypertension which, both clinically and histologically, is indistinguishable from malignant essential hypertension. This discovery that renal hypertension can be induced without obstructing the renal circulation and in the absence of manifest renal damage is of great interest. It opens new possibilities for the role of the kidney in the genesis of chronic hypertension, and particularly of essential hypertension, where a renal mechanism has hitherto appeared less likely because, in the early stages, there are no structural changes in the kidney. These observations confirm and explain in a remarkable way the different clinical syndromes described by LUXTON [1] in his account of radiation nephritis. The pathological features of this nephritis were reported by RUSSELL,[2] and the limits of renal tolerance to X rays were carefully assessed by KUNKLER et al.[3]

BODEN [4] examined 161 patients who had been given X-ray therapy for malignant growths of the mouth and neck, and found 10 with radiation myelitis of the cervical spinal cord, which was fatal in 5 cases. BODEN [5] later reviewed 7 cases of radiation myelitis of the brain-stem, and thus confirmed and greatly expanded the work on isolated cases of AHLBOM,[6] SMITHERS et al.,[7] and STEVENSON and ECKHARDT.[8] Cerebral damage from radiation has been similarly recognised clinically by WACHOWSKI and CHENAULT [9] and PENNYBACKER and RUSSELL.[10] Radiation damage to the lung was first described by GROOVER et al.[11] and was brought clearly again to our notice by WHITFIELD et al.,[12] who recorded 29 cases. WHITFIELD and KUNKLER [13] described 4 patients with electrocardiographic changes following X-ray treatment to the thorax. Furthermore, the threat of leukæmia from X-radiation seems real enough, evidence coming from studies of patients with ankylosing spondylitis treated with X rays,[14] from the incidence of leukæmia in children given X-ray treatment in infancy for enlargement of the thymus,[15] from the increased death-rate among physicians practising radiology,[16–18] and from the death-rate from leukæmia attributable to the atomic explosions in Nagasaki and Hiroshima.[19–21]

Radiotherapy is of immense value as radical treatment for certain malignant growths, especially cancers of the skin, lip, tongue, and uterine cervix, and is used as palliative treatment for many other types of neoplastic disease. There is also a sound basis for prophylactic irradiation of the abdomen after unilateral orchidectomy for seminoma [22]—a practice which drew attention to the nephritis caused by X rays.

X-ray therapy having been in vigorous use for over thirty years, it may be asked why its clinical side-effects have not been investigated more closely. FORSSELL [23] stated emphatically: "A medical man who devotes his services to a radiotherapeutic clinic must forsake all else and be willing to devote life and soul to radiotherapy." Is the old adage relevant here—"Love is blind but the neighbours ain't"? The radiotherapist may seem somewhat uncritical of the side-effects which alarm his colleagues. There are, however, important contributory factors. Commonly a latent period of weeks or months divides the start of X-ray therapy from the development of symptoms of incidental X-ray damage. It has been only too easy to dissociate such symptoms from the X-ray therapy and to attribute them to metastases or to an extension of the primary growth—and even to prescribe further X-radiation on that account. Furthermore, a feature of X-ray therapy is the variation in susceptibility between patients, as between individual tumours. Also, radiotherapy is a developing science; new techniques with incompletely known effects are constantly under trial. But perhaps the main difficulty is that the radiotherapist's attention is focused on the malignant growth. He knows that the patient's survival depends on its eradication, and, half-measures being fraught with peril, makes the primary treatment as radical as possible.

It profits all concerned, especially the patient, if radiotherapists work in close association with clinicians. "Combined clinics" are now widely established in which radiotherapist and surgeon or gynæcologist see the patients together, and seek to agree on diagnosis and treatment. Radiotherapy should not be isolated. It should be part of a general scheme, and those who conduct it should maintain constant contact with both physicians and surgeons in diagnosis, treatment, and

1. Luxton, R. W. *Quart. J. Med.* 1953, **22**, 215.
2. Russell, H. *Edin. med. J.* 1953, **60**, 474.
3. Kunkler, P. B., Farr, R. F., Luxton, R. W. *Brit. J. Radiol.* 1952, **25**, 292, 190.
4. Boden, G. *ibid.* 1948, **21**, 249, 464.
5. Boden, G. *ibid.* 1950, **23**, 1, 79.
6. Ahlbom, H. E. *Acta radiol., Stockh.* 1941, **22**, 169.
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12. Whitfield, A. G. W., Bond, W. H., Arnott, W. M. *Quart. J. Med.* 1956, **25**, 97, 67.
13. Whitfield, A. G. W., Kunkler, P. B. *Brit. Heart J.* 1957, **19**, 1, 53.
14. Court-Brown, W. M., Abbatt, J. D. *Lancet*, 1955, i, 1283.
15. Simpson, C. L., Hempelmann, L. H., Fuller, L. M. *Radiology*, 1955, **64**, 840.
16. Ulrich, H. *New Engl. J. Med.* 1946, **234**, 45.
17. March. H., *Amer. J. med. Sci.* 1950, **220**, 282.
18. Peller, S., Pick, P. *ibid.* 1952, **224**, 154.
19. Folley, J. H., Borges, W., Yamawaki, T. *Amer. J. Med.* 1952, **13**, 311.
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21. Moloney, W. C., Kastenbaum, M. A. *Science*, 1955, **121**, 308.
22. Boden, G., Gibb, R. *Lancet*, 1951, ii, 1195.
23. Forssell, G. *Canad. med. Ass. J.* 1933, **28**, 30.

follow-up. Much is already being done to avoid the incidental dangers of X-radiation—for instance, by using megavoltage and by "shielding" techniques. But radiotherapy remains a powerful weapon which can be fatal to both friend and foe; and the whole resources of medicine are required to ensure that its edge is turned always against the invader.

Influenza Vaccines

THE circumstances of the recent influenza epidemic have been unique in many ways. From the time when the so-called Asian viruses first appeared and showed their ability to spread, it was clear that a world-wide epidemic could be expected. Accordingly in many countries, including the U.S.A. and this country, there was a short period during which vaccine could be prepared in readiness for the epidemic. Plans were made in the U.S.A., and to a lesser degree in this country, to use vaccine on a larger scale than ever before. To some extent these plans were disorganised by the fact that the epidemic got under way well ahead of winter—the usual season for influenza epidemics. At the moment the epidemic is on the wane, but a second wave may come later in the winter.

It is too early yet to judge how effective the influenza vaccine has been; this information can only come from controlled trials carried out under various conditions. In a small trial [1] 70 volunteers in an American State penitentiary were vaccinated last July with either Asian vaccine or an inert fluid, in such a way that neither the volunteers nor the clinical observers knew which inoculation had been given to each individual. Three to four weeks later 55 of the volunteers were inoculated with live Asian virus in the form of a pool of nasopharyngeal washings collected from Boy Scouts who took ill while attending a jamboree. Volunteers first received an instillation of saline into their nostrils in order to clear away all mucus, and then the inoculum was sprayed into each nostril and into the oral pharynx by means of a De Vilbiss atomiser, and the oral pharynx was also swabbed vigorously with a swab dipped in the inoculum. It was calculated that each volunteer received about ten thousand infective doses of virus, corresponding to one or two drops of nasopharyngeal secretion. Altogether 78% of 23 volunteers in the control group developed influenza, compared with 44% of 32 volunteers in the vaccinated group. Clearly the results of this limited trial, in which an artificial method was used for inducing infection, can be taken as only a very rough guide to what may be expected under natural conditions of exposure to infection. Nevertheless the findings suggest that the vaccine is unlikely to have dramatic protective effects, and unofficial reports of its behaviour under natural conditions are in line with this conclusion.

The results of previous trials of influenza virus vaccine have varied; in some epidemics protection-rates of 70–80% have been found, while in others vaccine has shown no beneficial action. The most variable factor is the virus itself, which seems to have an almost unlimited capacity to mutate from one epidemic to the next; and the best protection-rates have been found when the virus used in preparing vaccine was antigenically closely related to the epidemic virus. The virus responsible for this latest epidemic is antigenically remote from previous influenza-A viruses.[2] It is therefore possible that a single inoculation of vaccine would not protect as well as two inoculations, and this is one of the questions which may be answered by trials now in progress. This possibility was suggested by a vaccine study [3] among schoolchildren in this country. Unfortunately it seems that knowledge gained from one vaccine trial cannot be readily used to predict the protective value of a new vaccine in a changed epidemiological situation, and clearly we do not know enough about the epidemiology of influenza and the best use of influenza vaccines to allow us to keep one step ahead of the virus. At the moment, while influenza is relatively mild and the degree of protection given by Asian-virus vaccine is still unknown, the decision how widely to use vaccine will be dictated mainly by political and economic factors.

1. Bell, J. A., Ward, T. G., Kapikian, A. Z., Shelokov, A., Reichelderfer, T. E., Huebner, R. J. *J. Amer. med. Ass.* 1957, **165**, 1366.

Hospital and Home

IF hopes are seldom realised in full, neither are fears. At the beginning of a year which will see the tenth birthday of the National Health Service, we can take comfort from its continuing state of flux. Instead of settling in a solid mould, as was predicted, it remains malleable enough to be adapted to new circumstances and new ideas of what the public needs. Already some remarkable changes are beginning.

Medicine, of course, is in a highly dynamic phase, which refuses to be bound by calculation and prophecy. Thinking of projects into which we have put our heart, some of us may reflect half ruefully on the effort we put, for instance, into pressing Governments to take tuberculosis more seriously and provide a great many more beds for its treatment. On which Dr. BERESFORD's letter in our correspondence columns this week is sufficient comment; for he is suggesting that the larger sanatoria should now be made over to other purposes. Again, in face of the shocking overcrowding of mental hospitals, it must have seemed to many that the urgent need was to relieve pressure by putting up new buildings. But the paper by Dr. CARSE and his colleagues (p. 39) shows once more that such thinking is out of date. From the varied experience of such enterprising places as Amsterdam, Nottingham, Manchester, Bristol, Bromley, the Maudsley, and now Worthing, a quite different system of looking after mental disorder is beginning to emerge—a system in which most of the patients will go on living at home while under treatment and will get the benefits of psychiatry, at day hospital or clinic, without risk of the desocialisation too often suffered in the past by those who have entered large and often isolated institutions. Within ten years, at latest, we may be wondering what to do with the many mental hospitals

2. Meyer, H. M., Jr., Hilleman, M. R., Miesse, M.L., Crawford, I. P., Bankhead, A. S. *Proc. Soc. exp. Biol., N.Y.* 1957, **95**, 609.
3. Hawkins, G. F. C., Hatch, L. A., McDonald, J. C. *Brit. med. J.* 1956, ii, 1200.

which are plainly unsuitable for the proper practice of psychiatry within the same framework as the rest of medicine.

Both in tuberculosis and in mental disorder we see examples of the new tendency to treat the patient at home in his natural surroundings. Similarly it is clear that a great many old people who have been forced into institutions ought to have had the kind of help that would enable them to go on living independent lives, often far more happily. There is always a risk that, with any new movement like the present endeavour to keep patients out of hospital, one may end up by sacrificing people to the idea: there are some mental patients, and some old people, and indeed some children, who can be kept at home only at immense cost in strain to their relatives—no matter what aid they may get from doctor, home nurse, health visitor, or home help. Indeed, home care can be financially much more expensive than hospital care, and cannot therefore always be preferred even on economic grounds. Nevertheless we are certainly witnessing the development of fresh arrangements by which many more patients will visit the hospital instead of living in it. And we are also witnessing a change in the nature of the hospital itself. At last people are getting away from the rigid concept of a hospital as consisting of a collection of similar wards, each staffed by a complete hierarchy of trained nurses, to which every patient who needs specialised investigation or treatment must be admitted. Many years' experience has shown how much can be done in outpatient departments without entering the wards; and still more could be done if suitable patients could have hostel accommodation overnight. Similarly many patients necessarily admitted to ordinary wards could, as they recover, graduate to wards without nursing supervision, where some of them could virtually look after themselves while obtaining whatever treatment they need. What has been wittily called "cafeteria medicine" surely has a real future; for it is futile to waste the service of skilled nurses on people who do not in the least require them.

In returning thus to the old theme of keeping patients out of hospital, we return also to the question of where the centre of gravity of medicine really is or should be. Are the hospitals merely an appendage to general practice, where 90% of the patients are seen and treated? Or is the hospital the true temple, and the family doctors no more than motile acolytes? We have repeatedly stated our opinion that, wherever the exact balance lies, grave damage will be done if the general practitioner ceases to regard himself as an all-round doctor capable of accurate diagnosis and treatment, and responsible for the care of patients rather than for the disposal of applicants. And in some ways the new trend towards keeping the patient at home, and bringing the specialist to his hearth, may help to restore the practitioner's position. On the other hand many of the present promising experiments—for example, the Worthing trial of domiciliary psychiatry; the Cambridge scheme for discharging patients early, with extra nursing care; the St. Mary's Hospital pædiatric team which goes to illness in the home [1]—are essentially extensions of hospital work: the hospital is sending out pseudopodia, and though these may make useful contacts with general practitioners they do not necessarily increase the activity or scope of general practice. Likewise the development of hospital departments for looking after special groups of people in an area, such as the epileptic or the spastic, may lessen rather than stimulate the family doctor's sense of being in ultimate charge.

Those who care about the future of general practice should, we think, be paying close attention to the process by which the hospital is projecting itself ever further towards the home. We for our part welcome this development as often realistic and helpful; but we still believe that everyday medical care should be given by an independent family doctor, directly responsible to his patient, and not by a hospital medical officer however motile. All too clearly, general practice on a high level is not going to be preserved unless those who have faith in it are prepared to translate that faith into works.

1. See *Lancet*, 1957, i, 313

Annotations

SYRINGES: CLEAN OR STERILE?

Of the many unsatisfactory ways of attempting to sterilise syringes in hospital, the commonest is boiling. Even in favourable circumstances this method does not eliminate spores; and circumstances may be so unfavourable that non-sporing organisms escape. Thus a doctor or nurse in a hurry may use a syringe after less than five minutes' boiling, or contaminated material may be put in the steriliser just before the syringe is removed. Some hospitals now have a central service, where syringes are autoclaved and wrapped for distribution to wards and departments; others (we hope all) will want to institute one. The Nuffield Provincial Hospitals Trust has done well to produce a little book [1] which sets out clearly and concisely all the information needed for the purpose. It represents the work of an operational research team who have investigated some existing syringe services.

The first chapter is so detailed that it amounts almost to a blueprint for building a department. The second describes the most economical way of running the department, and suggests means of greater economy when newer apparatus is to be had. The third shows that the capital outlay for a capacity of 500 syringes a day would at present be about £1600 and the running costs (including syringe and needle replacements) £3725 a year, or about *5d.* a syringe. A service on a national or regional scale would not be more economical than one on a group or hospital scale. Capital depreciation is not considered, and the cost of "sterilising" syringes by boiling is only briefly discussed. A central service would make for some saving in that ward sterilisers are apt to be left boiling too long, with waste of fuel, and are costly to maintain; the saving would be appreciable if all sterilisation (not merely of syringes) were done centrally.

The safety, convenience, and possible economy of central syringe-sterilising services strongly commend the method to all hospitals, and anybody planning one now has useful guidance at hand.

1. The Planning and Organisation of Central Syringe Services. Nuffield Provincial Hospitals Trust, Nuffield Lodge, Regent's Park, London, N.W.1. 1957. Pp 59. 2*s.* 6*d.*

BARBITURATES AND GLUCOSE

IT has been recognised for some years that the injection of hypertonic glucose into an animal awakening from barbiturate narcosis will reinduce anæsthesia.[1] This response has been investigated in man by Dhunér and Nordquist,[2] who were prompted by the chance observation that administration of cortisone to a patient recovering from an overdose of phenobarbitone returned him to a state of deep unconsciousness. (Their report appears in the first issue of *Acta Anæsthesiologica Scandinavica*.[3])

A series of 20 further patients was observed, of whom 18 had had an overdose of a single identifiable barbiturate and 2 an overdose of promethazine. Of these 20, 13 received 50–100 mg. of cortisone intravenously or intramuscularly and 7 9–12 g. of glucose intravenously in a 30% solution immediately they had awakened from the intoxication. Unconsciousness, assessed clinically in all cases and by electroencephalographic tracings in 6, was reinduced in some degree in 16 cases—in 8 to a level approximating to that on admission. A control series of non-intoxicated patients who received similar quantities of cortisone or glucose showed no effects of any kind.

Dhunér and Nordquist cannot explain these findings. They found no change in the plasma-barbiturate level after injection of glucose, but an occasional fall (which was not correlated with the clinical effects) shortly after administration of cortisone. They rightly stress the potential clinical importance of such reinduction of unconsciousness not only in the treatment of barbiturate or promethazine poisoning, but also in anæsthetic practice.

GERIATRICS IN THE HOME

WITH the Ministry of Health again rightly pointing out that old people who are unwell should if possible be cared for at home instead of being admitted to overcrowded hospitals,[4] the report of a pilot experiment in geriatric reablement in the home should be of great interest not only to administrators but to every family doctor.

This experiment [5] was undertaken by the geriatric unit of the Belfast City Hospital, with the help of £5000 provided from the Nuffield Provincial Hospitals Trust; and its basis was a belief that there are elderly invalids who are getting good home care but nevertheless risk delayed recovery, or even permanent bedfastness, through lack of reablement facilities which are usually to be had only in hospital. If these facilities were brought to the home, might not the burden of ill-health—on patient and relatives alike—be lightened and the demand on long-stay hospital beds lessened? The report recounts how the need was established and how the cases for trial were selected. Of 272 patients initially referred by their doctors, 85 were thought suitable, 37 of these being hemiplegics and 28 cases of arthritis. Medical assessment by the visiting geriatric physician was the basis of the advice on nursing management and general care. In treatment the mainstay was physiotherapy—with emphasis on what the patient and relatives could do for themselves. After courses of up to 50 treatments (though often much fewer) it was judged that about two-thirds made a satisfactory recovery. Though the cost of the treatment averaged 15*s*. 9*d*. for each visit by the physiotherapist, to get similar results with the patient in hospital would have cost considerably more.

Dr. Adams and his colleagues are certainly not pleading for unrestricted home physiotherapy. Less than a third of the patients referred were in fact thought suitable, and in making this decision good home circumstances were considered as important as a medical condition capable of improvement. The conclusion that "home treatment and rehabilitation has been successful . . . within the limits defined" is qualified by its description as "a useful aid to comprehensive home care services for the aged" rather than an end in itself. For most of the aged sick at home, who would be unlikely to benefit from treatment of this kind, the Belfast team believe that more could be done if the existing services provided by statutory and voluntary bodies were better coordinated. They suggest that every area should have a counselling centre to which the general practitioner could turn, and which could provide a skilled social worker (preferably a health visitor) to assess the home situation, with power to focus all the necessary services where they are needed. This valuable recommendation supplements the growing feeling that such, indeed, is an important function of the health visitor of today and tomorrow.

PORTOPULMONARY ANASTOMOSES IN HEPATIC CIRRHOSIS

OVER twenty years ago Snell [1] observed that in some patients with hepatic cirrhosis the oxygen saturation of the arterial blood was reduced. That this was not due to any impairment of gaseous diffusion from the pulmonary alveoli to the capillaries was shown by Abelmann and his colleagues [2] in Boston. These findings could only mean that a considerable volume of venous blood was diluting the arterial blood in the pulmonary veins; and, since there was no reason to suppose that this was coming from underventilated areas of lung, the most probable source was portal blood shunted into the pulmonary venous system. Calabresi and Abelmann [2] therefore sought to demonstrate the anastomotic channels.

Anastomoses between the pulmonary and azygos veins via the bronchial veins have long been known to exist, and the possibility that portal blood followed this route was investigated. In 20 cadavers the portal vein was injected in situ with a radio-opaque lead gelatin mass too viscous to enter vessels below 40 μ in diameter. The mass was coloured with methyl-green so that its distribution could be readily followed both by dissection and by radiography. Of the 20 bodies studied, death had been due in 10 cases to cirrhosis of the liver with ascites and in 6 to congestive cardiac failure. In the remaining 4 cases there was no significant cardiac or hepatic disease. In each of the cirrhotic cases there were dilated and tortuous periœsophageal veins injected via the coronary and short veins of the stomach. These periœsophageal veins anastomosed freely with veins in the posterior mediastinum, with pleuropericardial veins, and, via the azygos veins, with the superior vena cava. Moreover, in 4 of the 6 cadavers in which a satisfactory injection was achieved, the posterior mediastinal veins anastomosed freely with peribronchial veins at the tracheal bifurcation and with the bronchial veins of the main-stem bronchi.

1. Lamson, P. D., Greig, M. E., Robbins, B. H. *Science*, 1949, **110**, 690.
2. Dhunér, K. G., Nordquist, P. *Acta anæsth. scand.* 1957, **1**, 55.
3. Published from Universitetsforlaget i Aarhus, Aaboulevarden 49, Aarhus, Denmark. 40 Dan. Kr. per annum. Edited by Dr. Eric Nilsson, Department of Anæsthesiology, University Hospital, Lund, Sweden.
4. Ministry of Health circular H.M.(57)86.
5. Adams, G. F., McQuitty, F. M., Fluit, M. Y. Rehabilitation of the Elderly Invalid at Home: an experiment in restoration of activity after illness amongst old people in their homes in Belfast. Nuffield Provincial Hospitals Trust. 3*s*.

1. Snell, A. M. *Ann. intern. Med.* 1935, **9**, 690.
2. Calabresi, P., Abelmann, W. H. *J. clin Invest.* 1957, **36**, 1257.

In one preparation a vessel was found running directly from the posterior mediastinal plexus to a tributary of a right pulmonary vein, while in 2 of this group the injection had reached the pulmonary veins and the left auricle and ventricle. In the cases of congestive heart-failure all 5 cadavers adequately injected showed gross anastomoses between the portal system and bronchial veins via the periœsophageal, mediastinal, and pleuropericardial plexuses, but in no case did the injection mass reach the heart or main pulmonary veins. A somewhat similar result was obtained in the cases with no cardiac or hepatic disease, but the injected vessels were invariably fewer and smaller than in the cirrhotic and cardiac groups.

The pressures in the portal and pulmonary venous systems in health are approximately the same. It is therefore theoretically possible for blood to flow from one to the other whenever the pressure in either system is pathologically raised; and the anatomical findings of Calabresi and Abelmann strongly suggest that such a diversion of flow actually occurs. Their radiographic demonstration of a dilated azygos vein in 5 living cirrhotic subjects and 4 with congestive heart-failure—i.e., in all cases where satisfactory pictures were obtained—is further evidence of the functioning of this anastomotic system.

PAIN

THE possibility of pain appeared when life first began, and the capacity to react to injurious stimuli was the earliest protective mechanism to develop. The power to perceive pain came later with the appearance of a complex nervous system. In the most highly developed animals a great variety of extra- and intra-corporeal stimuli can produce a sensation of pain, and in man, among the internal stimuli, disordered thought and emotion can give rise to sensations of pain alleged to originate in a somatic region. In all ages there have been theories to account for pain, from the primitive idea that it is always inflicted from without, by enemies or spirits, and can be extracted by mechanical or magical means, to the highly philosophical hypotheses of some of the Greeks. Many of the Greek ideas seem remarkably like those of our own times, though in fact a superficial similarity of principle covers a wholly different background of knowledge and speculation. On the other hand, it is possible that the meaning was closer to our own than we think, because though certain words can be translated, the contemporary significance of them has been lost. Not until the anatomy of the nervous system was at least partially known could rational theories on the cause and perception of pain be developed; but we are still unsure of the peripheral and central mechanisms of pain.

As Dr. K. D. Keele points out, in a fascinating account [1] of the knowledge, or anatomies, of pain from primitive times to the present day, we are apt to think that only the present or immediate past has made any notable contribution to the problem. It is salutary to realise that Galen believed the sensory and motor nerves to be separate, and that the brain received all sensations. He even performed the experiment of hemisection of the spinal cord and noticed the paralysis on the same side as the section, but failed to notice the contralateral sensory loss. In this field, as in so many, the ideas of Leonardo da Vinci were well in advance of those of his contemporaries.

Despite the great amount of work that has been done in the past 150 years, we are still unable to explain the diversity of pain sensations or to describe many of them, just as we still do not know where and how pain is perceived. As Keele says, there is now a strong tendency to return to the idea of a sensorium commune and say with Harvey that " we do not feel with the same sense by means of which we are conscious we feel . . . but by another sense or sensitive organ . . . by which we examine those things that reach us through each of the external sensoria ".

1. Anatomies of Pain. By K. D. KEELE, M.D., F.R.C.P., consultant physician, Ashford Hospital and Staines Hospital. Oxford: Blackwell Scientific Publications. 1957. Pp. 206. 27*s*. 6*d*.

ANTIBIOTIC PROPHYLAXIS

IN discussing the abuse of antibiotics we have deplored the routine employment of these drugs as prophylactics.[1] More often than not, the belief that antibiotics will prevent bacterial infections is unjustified, and their misuse in this fashion is potentially hazardous. Enumerating what he held to be the legitimate uses of prophylactic antibiotic therapy Garrod [2] pointed out that the suitable occasions are specialised and relatively uncommon. To use antibiotics for clean operations with the object of escaping wound sepsis or respiratory complications is a vain hope; as a gesture it represents lack of confidence by the surgeon in his own or his staff's aseptic technique. Moreover, even when there is a proper indication for antibiotic prophylaxis, it is often impossible to prevent bacterial infection in this way. There is good hope of success in preventing specific infections due to bacteria that are always sensitive to a particular drug—for example, in the successful prevention of group-A hæmolytic streptococcal infection and its complication, rheumatic fever, with penicillin; and of meningococcal infection with sulphonamides. Results are not so good, however, if cover is required against a variety of organisms that may be resistant to the agents used. Pulaski [3] in a recent brief review refers to reports of unsuccessful prophylaxis in these circumstances. Antibiotics failed to prevent bacterial complications in measles and in cases of poliomyelitis with tracheotomy. Among patients undergoing operations on the biliary tract, subtotal gastrectomy, or resection of the colon with anastomosis, postoperative complications were as common in those who received antibiotics as in those who did not, and the incidence of wound infections after appendicectomy for acute suppurative and acute gangrenous appendicitis was not reduced by parenteral tetracycline therapy.

Antibiotics are often prescribed as a prophylactic for unconscious patients, and Petersdorf et al.[4] have evaluated this procedure in a careful study of 72 comatose patients. Unconsciousness was generally the result of a cerebrovascular accident. Some of these patients received antibiotics either singly or in combination, others did not. No benefit was derived from the chemotherapy; on the contrary, patients given antibiotics were more susceptible to pneumonia, cutaneous staphylococcal infections, and bacteræmia due to gram-negative bacilli. Chemoprophylaxis did not reduce nasal or nasopharyngeal carriage of *Staphylococcus aureus*, and the strains isolated from the treated group were more resistant to antibiotics than those cultured from the controls. Replacement of the nasopharyngeal flora by gram-negative bacilli was commoner in those receiving antibiotics. Routine adminis-

1. *Lancet*, 1955, i, 1059.
2. Garrod, L. P. *Brit. med. J.*, 1955, ii, 756.
3. Pulaski, E. J. *Practitioner*, October, 1957, p. 465.
4. Petersdorf, R. G., Curtin, J. A., Hoeprich, P. D., Peeler, R. N., Bennett, I. L. *New Engl. J. Med.*, 1957, **257**, 1001.

tration of antibiotics did not prevent infection of the bladder in patients with indwelling urethral catheters but often resulted in the infecting organism being a highly resistant proteus or pseudomonas. Petersdorf et al. concluded that, far from being beneficial, antibiotic prophylaxis in these patients was distinctly risky.

The danger of widespread chemoprophylaxis is not only to the patient himself but also to the hospital community at large, for every patient given antibiotics may become a source of highly resistant organisms. In situations where infection is a risk the best policy is one of watchful waiting and vigorous treatment of specific intercurrent infections if they develop. But, since prevention still is better than cure, there is also a need for some fresh reviews to be made of the " aseptic regime " as practised in our hospitals, especially in the wards and casualty departments.

TOTAL ADRENALECTOMY IN MALIGNANT HYPERTENSION

As long as hypertensive disease remains in the benign phase the physician can afford to take his time in deciding on the best course of treatment, whatever his misgivings about the term " benign ". But once the malignant phase is entered, he faces a desperate medical emergency in which every day counts, because the high blood-pressure has now begun to cause renal damage of a kind which will generate secondary hypertension and soon render the disease irreversible. If left untreated this process is virtually certain to kill the patient within months. On the other hand if the pressure can be reduced early enough and kept under control—not necessarily at a normal level—the malignant process can often be held indefinitely in check.

One possible way of doing this is to remove both suprarenal glands. But since the adrenal cortex is essential to life, and has complex and poorly understood functions which can be only partly restored by substitution therapy, its total removal cannot be contemplated without misgiving.

It is true that the blood-pressure is low in adrenal insufficiency and high in certain rare forms of cortical overactivity in man, and also that the level of experimental renal hypertension can be lowered by adrenalectomy and restored by treatment with cortical extracts. These facts and many others leave no room for doubt that the suprarenal cortex plays an important part in the normal control of blood-pressure. But so do many other factors, and it would be unwise to conclude from the available evidence that the suprarenal cortex is vitally concerned in the pathogenesis of essential hypertension. In these circumstances adrenalectomy must be regarded simply as one of a number of ways of lowering blood-pressure, neither more nor less empirical than administration of hexamethonium or reserpine. None of these corrects the essential abnormality of hypertension, and treatment at present is largely a matter of steering an uncertain course between the opposing evils of excessively high pressure on the one hand and excessively low pressure on the other.

How has adrenalectomy worked in practice? Professor Melville Arnott and his associates [1] have lately reviewed the published reports on this question. Much of the evidence is difficult to assess because commonly adrenalectomy has been subtotal or has been combined with other measures, owing to a proper concern with helping the individual patient rather than answering a general question. But with generous allowance for the inadequacy of the data and the serious condition of the patient, the results of adrenalectomy do not make cheerful reading. The immediate mortality is disturbingly high, and of the survivors the proportion whose symptoms persist and who die later on is not encouraging. Arnott et al. felt that a more precise assessment was needed because of the evidence relating the suprarenal to hypertensive disease, which they regard as strong; and they decided to make detailed studies in a limited series of six patients with malignant essential hypertension who had failed to respond satisfactorily or were intolerant to intensive treatment with oral or parenteral antihypertensive drugs. Their criteria in assessing response or intolerance are not stated, but severe renal failure was regarded as contraindicating adrenalectomy.

After 20–30 days' rest in bed without other treatment, bilateral adrenalectomy was performed under general anæsthesia. Cortisone treatment was started the day before operation, the dose being reduced as soon as possible afterwards, and detailed clinical and laboratory observations were continued for many days. Of the six patients three died within 8 weeks of the operation: one within 36 hours from a precipitous fall in blood-pressure with extensive cerebral damage; a second on the 6th day from ventricular failure following a steep rise of pressure, possibly due to too much cortisone; and the third from a cerebral thrombosis 53 days after the operation. The remaining three patients are all alive, two after 2 years and one after 18 months, and in a satisfactory state although signs of mild adrenal deficiency have developed, and a slight increase in the dosage of cortisone quickly recalls a severe hypertensive state.

Thus adrenalectomy may, like antihypertensive drugs, reverse the malignant phase in essential hypertension; but, as Arnott et al. point out, it should not be undertaken unless medical measures have failed, and it should never be attempted in the presence of frank renal failure. At the same time the experience of Arnott et al. confirms earlier reports that total adrenalectomy in malignant hypertension is an extremely perilous undertaking which has no specific effect on the underlying hypertensive state, and many physicians may prefer to persevere with vigorous medical treatment.

MINOR METAMORPHOSIS

AT this New Year we have changed the type in which the text of *The Lancet* is printed. Our object is to make it, on the whole, easier to read, without much loss of matter. Having waited long but vainly for someone to design a new type which would be both suitable and very modern, we have reverted instead to one of the old masters of typography. Christophe Plantin (1514–89) would scarcely recognise the type named after him: indeed the original fount is now said to have been cut by Garamond or Granjon. But the Monotype version of Plantin which we are now using is both traditional and well proven, having given good service since it was issued in 1913.

To those who liked our pages as they were, we are grateful; but we hope that they may in time get used to the new ones. Meanwhile they will recognise that occasional metamorphosis is a biological necessity for a journal as for other larval organisms. The ultimate imago is beyond our present imagining.

1. Arnott, W. M., Crooke, A. C., Donovan, H., Taylor, S. H. *Quart. J. Med.* 1957, **26**, 50.

Special Articles

A DISTRICT MENTAL HEALTH SERVICE

The Worthing Experiment

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From Graylingwell Hospital, Chichester

FOR over a century, psychiatric practice in Great Britain has put its emphasis on inpatient treatment; and the public have come to believe that little can be done outside the mental hospital. Up till 1930 there were few outpatient clinics, little encouragement was given to seek early treatment, and positive action was taken only after the illness was fully established and admission under certificate to a mental hospital was unavoidable. Even today, for the great majority of mentally ill patients, treatment still means admission to hospital. The psychiatric units attached to teaching hospitals are primarily intended for teaching and research; and, though outpatient clinics at general hospitals provide some therapy, large numbers and shortage of time oblige them to refer to mental hospitals most of their patients who need treatment. Any mental hospital which cares to examine its records will find that from half to three-quarters of its admissions come from the clinics.

Faced with a continuing increase in the number of admissions, together with serious overcrowding, our mental hospitals will soon be unable to meet the demands made on them. Admissions to designated mental hospitals in England and Wales rose from 55,856 in 1950 to 71,699 in 1954, and to 78,586 in 1955. By 1955 these hospitals were overcrowded to the extent of 17,965 patients. Clearly immediate action is essential if the required treatment is to be given. One solution is build more hospitals; but this, however, is impracticable because of the cost and the difficulty of staffing. A possible alternative is to spread the load by greatly expanding outpatient treatment facilities.

In 1956 the South West Metropolitan Regional Hospital Board, with the financial help of the Nuffield Provincial Hospitals Trust, decided that Graylingwell Hospital should undertake a two-year pilot experiment by providing an outpatient and domiciliary treatment service based on the coast town of Worthing. The service began on Jan. 1, 1957.

The First Ten Months

The area covered extends about 9 miles eastwards, 9 miles westwards, and 8 miles inland, and covers a population of 160,000 people. All patients, except a few sent from the magistrates' courts, are referred to the service by their family doctors: we insist on this because we are convinced that a close and friendly liaison with the patient's own doctor is essential. No patient is admitted to Graylingwell from the Worthing area without being screened by the service, and thus ensures that hospital treatment is reserved for those cases in need of it.

Worthing and district were chosen for this pilot scheme because they are sufficiently remote (22 miles) from the parent hospital, Graylingwell, to show if it is possible to provide psychiatric treatment for large numbers of patients without the immediate availability of the resources of a modern mental hospital. Another reason was the variety of the population. There are people living in busy towns and others in hamlets and villages, some remote and isolated. There are retired, professional, business, industrial, and agricultural classes. Worthing itself has one of the highest proportions of elderly people of any town in England or Wales, and how far it is possible to treat as outpatients the aged who become psychiatrically ill is a matter of urgent concern to us.

The headquarters of the service are housed in a 20-bed unit, already belonging to Graylingwell, which is now also used as an active treatment centre and day hospital. There are no resident patients.

Working in the service are two full-time and one part-time psychiatrists (five half-days per week). There is always one trained psychiatric sister living at the treatment centre, and during weekdays there are also two staff nurses and two ward orderlies. Staff for the treatment of male patients is supplied from Graylingwell by the chief male nurse who, with the matron and their senior staff, visit the centre periodically. The social work is done by one psychiatric social worker and one hospital almoner. Occupational therapy is organised and supervised by one senior occupational therapist. The secretarial work is done by one medical secretary with part-time clerical help (four half-days per week) supplied by the hospital.

The Patients

In the first ten months the service dealt with 1192 patients (376 men and 816 women) of whom 1110 were new cases. The other 82 were patients who had had psychiatric treatment before Jan. 1 1957 and are now receiving follow-up supervision and treatment through the Worthing service. 318 of the patients were sixty-five years of age or over.

The psychiatric outpatient clinic of Worthing Hospital is included in the service and 421 patients were seen there. This close link with a general hospital has already proved of great advantage. 339 patients were seen by appointment at the treatment centre. This part of the service is much appreciated by the family doctors because the patients are examined and a report sent promptly and there is no need to wait for a vacancy at the clinic.

Treatment

Over 1000 domiciliary visits were paid by the psychiatrists to 432 patients. Often more than one visit is necessary, and with the assistance of the social worker we are often able to help the patient and his relatives to sort out difficulties which are largely responsible for the breakdown. This work is exacting and time-consuming, but we believe it is sometimes better psychiatric treatment than to allow the patient to run away from his problems by sending him into hospital. No fee was received for any of these visits.

Patients cannot be effectively treated as outpatients unless extreme care is used in physical treatments. Each of our patients first has a thorough physical examination and a comprehensive laboratory investigation before treatment is begun. These were carried out at the department of pathology at Graylingwell Hospital.

Among the outpatients attending the treatment centre electroconvulsant therapy has been used extensively. The courses are short, averaging only 4·9 treatments. Although this is less than is usually given to inpatients, it has proved adequate and so far few patients have relapsed. As it is not necessary to enter hospital, patients are willing to be treated earlier in their illness and need only this shorter course.

Modified insulin has also been used to good effect in the treatment of tension states. The patients spend the day in the treatment centre, and to avoid complications only a low dosage is used, but the course is lengthened if necessary.

Individual psychotherapy is the main treatment for many patients, and is, of course, given to all patients attending the

centre. A weekly session of group psychotherapy is also held. Details of the treatments given up to Oct. 31 are:

—	Electrical treatment		Modified insulin		Psychotherapy		Drug abreaction	
	M.	F.	M.	F.	M.	F.	M.	F.
Patients	68	249	3	163	68	125	3	13
No. of Treatments	365	1201	54	1957	309	827	3	26

Effect on Hospital Admissions

The number of admissions to Graylingwell Hospital and Summersdale Hospital (its non-statutory short-stay unit for recoverable patients) from the area served by the Worthing and District Mental Health Service during the first ten months of 1957 fell by 324 (59%), compared with the same period in 1956 (table I). Admissions from the rest of the catchment area of the hospital increased by 23, though 1956 was the year with the highest admission-rate in the history of the hospital, which suggests that the demand for psychiatric treatment is still increasing.

TABLE I—ADMISSIONS TO GRAYLINGWELL HOSPITAL AND SUMMERSDALE HOSPITAL

—	1956	1957	Difference
Admissions from catchment area served by Worthing service	548	224	−324 (−59%)
Admissions from catchment area *not* served by Worthing service	603	626	+23 (+4%)
Total admissions	1151	850	−301 (−26%)

At Summersdale Hospital the impact of the scheme has been even greater (table II); the number of admissions fell by 221 (77%). This has not surprised us, for we have become convinced that if outpatient treatment is available these patients need only exceptionally enter hospital. On the other hand, the reduction of 40% in the admission-rate to Graylingwell Hospital was unexpected, for this hospital receives the more advanced and acute mentally ill patients, and we were doubtful whether the service could help them much. The reduction, however, has been steadily maintained over the ten months and it seems that an outpatient service can treat even these patients where the background is favourable.

TABLE II—ANALYSIS OF ADMISSIONS FROM WORTHING AREA

—	Graylingwell Hospital			Summersdale Hospital			Total		
	M.	F.	T.	M.	F.	T.	M.	F.	T.
1956 ..	108	152	260	69	219	288	177	371	548
1957 ..	69	88	157	22	45	67	91	133	224
Reduction ..	39	64	103	47	174	221	86	238	324
	36%	42%	40%	68%	79%	77%	49%	64%	59%

Elderly patients are especially reluctant to enter hospital and outpatient treatment has proved effective in this important group of patients. The number of admissions among elderly patients fell by 55 (51·4%) in 1957 (table III).

The commonest psychiatric illness among these patients is depression. The attack can be severe and often it is the first psychiatric breakdown in a patient with a good stable personality. If the condition is diagnosed promptly, suitably modified electrical treatment as an outpatient will bring about a remission. But delay in treatment allows time for physical deterioration.

TABLE III—ADMISSIONS AMONG ELDERLY PATIENTS

Age	1956	1957	Difference
65–69 ..	57	20	−37
70–74 ..	50	32	−18 } −55 = 51·4% reduction
75–79 ..	31	18	−13
80+ ..	31	20	−11 } −24 = 38·7% reduction
Total ..	169	90	−79 = 46·9% reduction

Among patients aged seventy-five and over the admissions fell by 24 (39%), but we adopt a cautious attitude toward this age-group. Though the reduction in the admission of elderly patients has been steadily maintained over the past ten months, the admission of senile patients fluctuates widely and the present reduction may be only temporary.

Discussion

Our experience at Worthing has convinced us that for a large proportion of psychiatric patients, admission to hospital is unnecessary and outpatient treatment can be entirely effective. Indeed, there is much to suggest that our mental hospitals have been carrying an unfair burden by being compelled to treat all types of patients without discrimination. It should not be thought, however, that our experience has led us to the conclusion that the mental hospital is an anachronism and redundant: indeed our respect for it has increased. Now, however, we see it in its true perspective as a hospital for selected patients, mostly with a good prognosis, but needing special treatment and conditions which cannot be provided by an outpatient service.

Each of us has had some difficulty in reorienting ourselves to this new form of psychiatric practice. We had accepted the idea that it was good for a patient with a mental illness to be removed to the artificial environment of a mental hospital and placed under control before he received treatment. In an outpatient treatment service it is never possible to divorce the patient from his family and background, and indeed from his own doctor. We ourselves, therefore, have had to make some readjustments.

Only a proportion of patients are suitable, and we have come to regard the following basic requirement as essential to successful outpatient treatment:

Good Public Relations

The success of a district mental-health service depends on its public having learnt to accept mental illness as it would any other illness and to seek advice and treatment promptly. In this respect, West Sussex is probably better off than many other parts of the country. For some years frequent talks, followed by visits to the hospital, have been given to many groups of people, and psychiatry and the mental hospital is no longer a mystery. Fear of Graylingwell has largely disappeared, as is shown by the fact that of the 1347 patients admitted last year, 85% were either non-statutory or voluntary patients. The Worthing service has itself done much already to encourage patients to seek treatment promptly.

Cooperative Patients

At the treatment centre and at the clinic we must have full cooperation from the patients. Usually this is willingly given; the patient does not want to enter hospital, but he does want treatment. Where insight is defective, however, admission to hospital may be necessary if treatment does not quickly bring about noticeable improvement.

Favourable Home Background

Our patients are not in hospital under trained observation, but they are at home with their families. Unless the relatives are prepared to work with us and to accept some responsibility for the patient, the case is unsuitable for outpatient treatment. Usually the relatives are most helpful, but we have to make sure, too, that they themselves are not exposed to unreasonable strain. If the pressure becomes too great, the patient must be admitted to hospital.

Reasonable Risk

The commonest risk, of course, is that of suicide by a depressed patient. If such a patient is living alone it would

be an unreasonable risk to treat him as an outpatient. On the other hand, if there is a favourable background and his history is reassuring, he may well be so treated. Each case must be treated on its own merits, but where there is any real doubt inpatient treatment is necessary.

Risk from a patient acting dangerously towards others is less common, and where such a tendency does exist we advise admission to hospital.

Another risk we have to assess is that arising from the physical condition. A patient may be referred to us suffering from a psychiatric illness which will benefit from treatment, but his physical condition may be such that it would be too risky to treat him as an outpatient.

Effective Range of Treatments

We retain in the Worthing service only those patients who can benefit from the treatments which we are able to offer. In our opinion the clinical results from outpatient treatment are equal to those of hospital treatment. We are unable, however, to provide deep insulin-shock therapy or prefrontal leucotomy and when patients need these forms of treatment we arrange for their immediate admission to hospital.

The medical practitioners have had also to make some readjustments because the procedure for the treatment of psychiatric patients has been changed. Formerly the doctor referred his patient either to the Worthing Hospital outpatient clinic, or, through the duly authorised officer, arranged for his immediate admission to hospital. Either way, apart from a psychiatric report, he often lost all personal contact with his patient until he received a second report informing him that the patient was being discharged. Today, for more than half the psychiatric patients in our area, treatment is given on an outpatient basis and the patient remains in the care of his own doctor. In general the new method has been welcomed. The family doctor is now working with the psychiatrist; and, while there must sometimes be difference of opinion, so far we have met no serious difficulties. If a serious difference of opinion should arise, we would leave the final decision to the patient's doctor. We have enjoyed meeting the doctors at the treatment centre or on domiciliary visits, when we are able to have friendly discussions about the diagnosis and treatment of their cases. Though formal reports are still necessary, this constant personal contact with the patient, his family and background, and his own doctor has offered us conditions which make possible the practice of individual psychiatry—the ideal of every psychiatrist.

The effect of the district service on Graylingwell Hospital is already noticeable. The fall in admissions has considerably eased overcrowding. This, we believe, could be entirely removed by the provision of outpatient treatment services in the rest of the hospital's catchment area, which is now under consideration.

Conclusion

The Worthing and District Mental Health Service is a two-year pilot experiment. It is essentially a research project, for this service is the first of its kind to be undertaken by a county mental hospital. It has been in operation only ten months. In our opinion, however, we already possess sufficient evidence to prove that such an outpatient service can do much to ease the strain on the mental hospital, and this was the object for which it was designed.

The Worthing service has revealed many aspects of clinical psychiatry which could be the subject of fascinating research for many years to come. Even at this early stage, however, it may also be indicating a blueprint for future psychiatric practice: each catchment area will have at its centre an efficient mental hospital, with satellite outpatient treatment services which ensure that only those patients are sent into hospital who really need to be there.

HIGHER EDUCATION IN AUSTRALIA

FROM AN AUSTRALIAN CORRESPONDENT

SINCE the war, Australia has become one of the most rapidly expanding countries in the world. The population has grown at a rate of $2^1/_2\%$ per annum over the past ten years, and there has been an equally startling growth of secondary industry, supported by a steady advance in primary production. At the same time Australia has come to play a much greater part in the political and economic affairs of South East Asia and the world at large. It follows that in the future she will require an increasing supply of university graduates to meet her professional, cultural, and technological needs.

In 1956 Mr. Menzies invited a committee, headed by Sir Keith Murray, chairman of the University Grants Committee in Britain, to investigate the position of the Australian universities and to suggest how these could best play their part in the development of the country. This committee's report shows a disquieting situation. Far from being ready to meet the immense future demands upon them, the universities of Australia are evidently tending to stumble under the burden of their present reponsibilities.

DIFFICULTIES OF AUSTRALIAN UNIVERSITIES

Their peculiar difficulties are often insufficiently appreciated outside Australia, and indeed have scarcely been realised by a majority of Australians. There are nine universities and two university colleges. Apart from the postgraduate National University at Canberra, which is a Commonwealth affair, the major universities are primarily the responsibilities of the States in which they operate, and so far New South Wales is the only State which has more than one. It is thus inevitable that regional problems should arise. The economies of the States vary widely, and the facilities and finances of the State universities are far from comparable. Nevertheless, many difficulties are common to all Australian universities, and the committee has considered some of these at length.

The basic problem is the weight of student numbers, particularly in the first year.

The Australian universities have set their faces against any form of pre-selection of students, and in consequence everyone who can pass the matriculation examination is automatically admitted to the first year in the faculty of his choice. The pressure is perhaps greatest in the departments of physics, chemistry, and mathematics, which provide the basis of so many professional curricula, but many arts departments are almost as badly affected.

Where classes are 800 strong and practical work is replicated in six or seven sessions, the individual is necessarily submerged, and it is almost impossible to organise the personal attention which is one of the most important things a university can offer. There is an appallingly high failure-rate in the first year, and the student comes to regard the examination as the chief motivation for his efforts. The attitude so acquired is unfortunately difficult to eradicate in the later stages of his education, when the desperate struggle for survival has abated somewhat.

At some universities very many part-time and external students are enrolled. Because of the awkward requirements

of laboratory and practical work, such students are found in greatest numbers in the faculties of arts, where they create special difficulties. For example, a great deal of teaching has to be done in the evenings, and lectures and seminars have to be duplicated.

Yet the principle of unrestricted entry is deeply ingrained by tradition. The previous educational experiences of matriculants are so varied that it is thought essential to give them all a chance under identical conditions before presuming to choose which of them are fitted to continue their education further. Indeed, the committee, after considering the situation carefully, did not suggest any modification of this admissions policy.

TEACHERS AND BUILDINGS

If student numbers are not restricted, efficient and meaningful education can be provided only where accommodation, equipment, and staffing are adequate, and in these respects the situation appears not only alarming but critical.

In most universities " temporary " buildings have been put up in an attempt at expansion; like all temporary buildings they have become permanent in an unpleasant sort of way, and a secondary growth of further " temporary " accommodation has sprung up around them.

This situation arises partly because the universities live under an administrative system which does not allow them financial security for more than a year ahead. Anything beyond ad-hoc planning is thus a desperate venture. Little has been done for many science departments since the day they were first equipped, and laboratories are often woefully ill-matched to the tasks now laid upon them.

Even more important is the difficulty of attracting and keeping staff of the requisite high quality, particularly in the sciences. The salaries paid are grossly out of line with the corresponding salaries in industry or in such bodies as the Commonwealth Scientific and Industrial Research Organisation, and superannuation conditions in many universities are unsatisfactory. Australian universities are also rendered unattractive by their isolation, both from each other and from the rest of the world. As the committee point out, Perth is as far from Sydney as London is from Istanbul. To make such conditions acceptable to the right sort of candidate it is therefore necessary to have not only competitive salaries and terms of employment but also well-organised and well-financed schemes of study-leave and travel.

The lack of adequate staff is one cause of the scarcity of honours and postgraduate students, which is a serious omen for the future. Concentration on the pass degree as the chief end of education means that most Australian students of above average ability go elsewhere to complete their honours courses, and are often lost to the country.

These disabilities have a readily understandable immediate cause—lack of money. Enough money, wisely applied, could transform the situation as regards accommodation and staff. The reason for the lack of money is also not hard to discover. Quite simply, the average Australian is not preoccupied with education. He has as yet little conception of the vital part the universities must play in the economy of his country, and the universities themselves have done little to make the situation clear to the public.

With time this lack of interest in the universities will right itself, but time is short. If the universities cannot cope with their present problems, how can they deal with the appalling overload they face in ten years' time? In 1967 the university student population is expected to be more than double that of 1957, and the prospect calls for immediate action.

RECOMMENDATIONS

The committee have made a number of recommendations designed to remedy the present disabilities and to render the universities fit for their future task.

The most important recommendation is the creation of a University Grants Committee on the lines of the British one. This would consist of a full-time chairman and seven part-time members and would function as an informal body without legislated status. Two members would be drawn from the professions or industry, and the remaining five would be academic members covering the five main groupings of arts, social sciences, pure sciences, applied sciences, and medicine and dentistry. Grants for recurrent expenditure would be made triennially, and would not be earmarked for particular purposes. On the other hand, non-recurrent grants would be given annually, and for specific purposes only.

The committee have recommended an extensive programme of financial first-aid for the next three years, while the University Grants Committee is finding its feet. They suggest that a total sum of nearly £A12½ million should be devoted to building programmes in the various universities, and that the Commonwealth Government should contribute towards these on an equal financial basis with the States, except that in Western Australia and Tasmania the Commonwealth contribution should be 25*s*. for every £1 spent by the State. About another £A1 million should be spent on equipping these buildings, and the Commonwealth Government should contribute 16% of this sum. An immediate increase in academic salaries is recommended, the rise being at least £A500 for professors and corresponding amounts for other posts. There should be an examination of the conditions of service to see how these might be made more attractive.

The committee recommend the creation of a new university in Melbourne to serve the needs of Victoria. This university would contain a medical faculty, which would ease the pressure on the present university and ensure an increased supply of doctors to a State whose medical requirements are said to be far from satisfied. The committee also suggest the creation of another medical school in New South Wales, possibly in relation to the New South Wales University of Technology. The medical school at Sydney has been dealing with vast numbers for many years, and this plan would undoubtedly help matters, though, as the committee suggest, it might be necessary to change the name of the University of Technology to avoid the implication that its medical graduates are technologists. Tasmania submitted a claim that the committee should consider the founding of a third medical school there, but in the opinion of the committee Tasmania cannot afford a medical school until the present disabilities of the university have been put right. It did, however, recommend the development there of a faculty of agriculture. Tasmania is now the only State without a medical school, for the medical school of the University of Western Australia began operations this year. It is to be hoped that the unsatisfied aspirations of potential Tasmanian doctors will be met by the creation of the second medical school in Melbourne.

The Commonwealth Government has already accepted these proposals. But the detailed planning and development of individual universities is, as Mr. Menzies has said, a matter for the States, and these have not yet pronounced on the report. It is expected that they will implement at least the building part of the committee's proposals, but clearly this will be of little use unless they also accept the salary increases and the other suggestions about the employment of university staff.

This historic report should mark the beginning of a new deal for the Australian universities and of recognition by the average Australian that he has in higher education not only an invaluable tool and a vital safeguard to his country's future, but also a priceless and irreplaceable cultural asset.

Points of View

DISAPPOINTMENTS IN DERMATOLOGY*

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SOME claim that they can recognise a consultant's specialty at sight; and I am told that the gynæcologist, neurologist, pathologist, and ophthalmologist present little difficulty to the initiated. To identify a solitary dermatologist might be less easy; but on his way to a consultation he can always be recognised by the expression of anxiety on the face of the practitioner who has called him out. My object here is to examine some of the reasons for this unhappy state of affairs, and to illustrate them from a few everyday problems.

* * *

The first skin clinic I attended as a student—it was also the last—was puzzling. I recollect a kindly physician who fingered the most alarming lesions, and then ran his hands over his face and through his hair. These lesions bore incomprehensible names, and so did the remedies applied to them; my pathology and pharmacology textbooks had not mentioned them. One particularly nasty sight was recommended to me thus: "Take a good look at this, you'll never see another." This seemed strange; I was even more puzzled when the next patient proved to have the same disease.

The outbreak of war brought these undergraduate studies to a premature close; but I still remember the frustration of those few hours, and many of us must have had a similar experience which has determined our subsequent attitude to the whole subject. It has made us view dermatology as a study apart from the rest of medicine having neither pathology nor therapy, beginning nor end.

An eminent pathologist has defined a hæmatologist as a man who makes a living by applying a series of different names to a succession of identical blue globules. An existence spent in the dubious differentiation of a succession of identical pink papules is all that is accorded in many circles to the dermatologist. Yet in most skin diseases, a careful history, a careful examination, and a considered diagnosis are as vital as in the rest of medicine.

Samuel Butler said that life is the art of drawing sufficient conclusions from insufficient premises: but there is no point in neglecting our premises altogether. The careful history and examination are never wasted; even if they do not give the answer, and you have to refer the patient to a dermatologist who makes a diagnosis of Pityriasis Lichenoides et varioliformis Acuta, your attention will have assured the patient that you are interested in him, and will give him confidence while you see him through the course of this disease, which may last for months, is not influenced by treatment, and is of unknown ætiology.

* * *

Let us imagine that we are confronted by a patient with a rash. At sight we can make a diagnosis of eczema, which statistically is bound to be correct nine times out of ten; or of dermatitis, which is the same thing for all practical purposes except in a court of law. But before we can attempt to treat the patient we must make an ætiological diagnosis too.

Here lies one of the difficulties: on the hands it might look the same, whether caused by 'Dettol,' diesel oil, 'Distaquaine', or divorce; on the face almost identical appearances may be given by sensitivity to cosmetics, chrome salts, or just conscience. Moreover, there may be multiple factors; a nurse may not show her sensitivity to streptomycin until she has some emotional upset, and her cure will involve mental readjustment as well as avoidance of the offending drug. But a clinical and environmental history will usually sort out these possibilities; for instance, sudden relapses and good remissions, particularly on exposed parts, point to contact dermatitis, perhaps from cosmetics or other chemicals; a chronic course, especially with a family history of eczema, asthma, or hayfever, makes one suspect a constitutional eczema.

Remember that it is not necessarily an expression of defeat to diagnose constitutional eczema: the diagnosis is often made for sound reasons, in the same way as one detects a constitutional asthma. And just as one tells an asthmatic to avoid murky and dusty atmospheres, so one may ask people with inborn eczema to avoid wet or dirty employment, without meaning that their eczema was initiated by such work.

Now comes the next cause of disappointment: we have obtained a fair idea of the diagnosis from the history and appearance of the presenting lesion; we become bold, and neglect to make a thorough examination of the patient. This is a very risky short cut. For example it can be very humiliating to have your case of "? varicose eczema with œdema" returned to you for treatment of his heart-failure.

Sometimes the patient makes mistakes—often deliberate—about the distribution of his lesions; or he may fail to mention that patch of psoriasis on his abdomen which would give us the clue to his extremely scurfy scalp; or he may be satisfied in his own mind that his broad syphilitic condylomata are really piles, and that this is neither the time nor the place to discuss anything except his distressing and abrupt loss of hair. Or perhaps the old lady may be concealing huge chronic leg ulcers; they are being treated by her kindly neighbour with some penicillin cream, so that what presents to you as an eczema of the face is really a sensitisation-eruption.

Here I should like to pause for a while to consider the phenomenon of sensitisation, or allergy if you prefer it, as applied to the skin. It is easy to understand how a chemical such as caustic soda or turpentine can cause inflammation after only one or two contacts. This is called primary irritation; it is easily recognised, easily avoided, and often correctly diagnosed by the patient. But the idea of secondary irritation, or sensitisation, is much more difficult.

In this case we are dealing with a comparable inflammatory response, but it is one which appears only after repeated contact with something which is not necessarily a primary irritant, even in heavy concentrations. The acute eczema which may result from repeated contact with primulas is one of the most familiar examples of this; but the number of potential sensitisers is almost infinite. They may be very hard to suspect; for the patient, once sensitised, may react to minute concentrations; and the cause may be some old and trusted friend such as a cosmetic which was thought to be vital to the continued integrity of the skin. I have heard quoted the case of a lady who developed patches of intractable eczema over the face and sternum; she was known to be sensitive to black hair dyes, but all attempts at ætiological diagnosis were foiled until it was observed that one of her male friends had a suspiciously black moustache.

Most of the remarks I have made so far apply with particular force to the difficulty of diagnosing occupational eczema; but I think the frustration which most of us have

* Based on a paper read to the North Gloucestershire branch of the British Medical Association, in April, 1956.

experienced in dealing with occupational dermatitis merits rather special examination.

The problem is complicated by its relationship with the Law. For reasons which are no longer valid, a man disabled by eczema gets more sick pay if it is attributed to his work than if it is idiopathic. To decide which it shall be is almost as difficult as to use the McNaughten rules, and the effects of the decision may be almost as disabling, even if somewhat less spectacular.

It is a curious paradox that the more sane a murderer appears to be, the greater is everyone's wish to prove him mad so that he may escape the worst penalties. In the same contrary manner, the more chronic and disabling, and hence the more idiopathic, the patient's dermatosis, the greater is everyone's natural desire to call it occupational, and thus to mitigate his poverty. But its persistence through months or years of idleness is really one of the strongest possible pieces of evidence against its occupational origin.

I do not deny that true cases of dermatitis from primary or secondary irritants arise in industry: these are comparatively easy to recognise, and to confirm by patch testing: they subside soon after the patient stops work, and do not return when he goes back to work away from the suspected chemical. But unfortunately such cases are a minority; in the majority of those that I see, all the medical probability is against an occupational cause, and in favour of a constitutional origin, with or without a psychological overlay. But medical probability is a very different thing from legal possibility, and where the possibility exists, we incline to give our patient the so-called benefit of the doubt and to allow him his compensation. The position is especially difficult where a constitutional predisposition seems to have been touched off by an occupational factor.

The subsequent history of such patients can be very depressing. Their eczema, being wholly or largely constitutional, might in any case persist for a long time; their natural desire to blame somebody for it is focused by our certificate on to their employers; and some degree of neurosis is almost bound to develop, especially in those who are maladjusted, or unhappy at home or in their work.

In such cases a solicitor may be consulted at this stage; and the probable results are so well known to most of us that they need no further elaboration. The dreary medical examinations, the dreary days in court, the expert witness obliged to admit that the dermatosis might be attributable to the occupation, and the final state of pensionable unemployability and pruritus, would all have inspired Dickens to great heights, if only the compensation laws had reached their present pitch of perfection in his day.

It is therefore unfortunate that, as the Law stands, we may well be forced into certifying that the patient has a legal possibility, against the weight of the medical evidence. We may have to do it, but we should realise what we are doing, and try to make it clear to the patient and his relatives.

In the long run, the only way out of this difficulty is to get the compensation rates altered—to abolish the illogical difference between the rates for sickness and occupational dermatitis. Cases of genuine occupational dermatitis could then be determined on reasonable medical grounds ; they should be made notifiable to the factory inspectors or public-health authorities, whose duty it would be to investigate the working conditions, with the dermatologist's help if required, and to advise suitable precautions to prevent similar cases. The patient's right to a common-law action on the grounds of negligence would remain unchanged, but there would be fewer initial stimuli to such an action. The money saved could be devoted to retraining eczematous patients in work where their eczema was not a grave handicap.

* * *

But enough of this theorising; practical men such as ourselves want to know what therapy is available. Disraeli defined a practical man as one who practises the blunders of his predecessors ; and dermatological literature is full of blunders which we can detect in the light of modern knowledge. They nearly all have one factor in common—namely, overtreatment.

An example of heroic treatment, which no doubt seemed perfectly reasonable when it was suggested, is contained in Radcliffe Crocker's *Textbook of Diseases of the Skin*; in recommending the use of thyroid extract in psoriasis, he writes:

"The dose should not be more than five grains a day to begin with, which in a week may be increased to ten grains and in a fortnight to fifteen grains if it is well borne; five grain tabloids are the most convenient form of giving it. The risk of disagreeable symptoms is out of proportion to the advantage of taking larger doses, which should never be given unless the patient is in bed and under supervision. Bramwell, however, got up to forty tabloids a day. Headache, sleeplessness or giddiness, and the pulse rising over a 100, should be the signal to stop it or to diminish the dose. Patients get thinner while taking it. Less frequent symptoms are nausea, vomiting, failure of breath, diarrhœa, and general rheumatic pains."

That was in 1905; but the contemporary scene gives little cause for complacency, and the road we have travelled over the past few years is strewn with discarded remedies, some harmful, some harmless, and nearly all very expensive. Yet we continue to believe in miracles when rest and other inoffensive remedies are far more likely to be successful.

In this realm many of our disappointments are the result of a mutual misunderstanding between ourselves and the drug firms. When introducing a new therapeutic substance to the profession in general, it is occasionally possible for the manufacturer to cite reports of full convincing trials taken from the pages of a reputable journal; it is reasonable for such a drug to be brought to the practitioner's notice, and little harm follows provided that the possible toxic effects are emphasised to him. But often the samples dispensed and the literature provided should imply no more than an invitation to practitioners to cooperate in a careful clinical trial; and to use new remedies from the makers on any other basis would do discredit to the outpatient department of an animal hospital. In dermatology it is the cause of many sensitisation reactions and of much disappointment to all concerned.

It happens for two reasons: the first is that we may not have time to demand to see full reports of thorough clinical trials, which may or may not have been performed: the second is that our patients with eczema include a high proportion of chronic cases. They are abnormally likely to react swiftly and unfavourably to local applications; they are the type of patient who is unlikely to have been included in a short clinical trial. Patients with chronic eczema are not necessarily curable: it is not kind to give them repeated disappointments; it is less than kind to give them repeated attacks of contact eczema, which can only make them worse in the long run.

Virtually all the true contact eczemas are self-limiting; and many other forms of eczema tend to undergo spontaneous improvement if the patient can have physical and mental rest. One of the commonest disappointments arises from neglect of this fact; we try to take short cuts. Rest in bed, oily or watery calamine to taste, and heavy sedation if necessary, are far more effective than an uncontrolled resort to the remedies on our blotting-paper. The skin cannot be bludgeoned into healing, even by hydrocortisone: it is a very mischievous animal—when it is attacked, it defends itself. A skin which has produced an eczema is already in a state of turmoil; it is very likely to become sensitised to almost any local application, and must be treated with the utmost respect.

* * *

One of the most urgent symptoms in dermatology is itching, and the preparations which claim to relieve this symptom give us many disappointments. The antipruritics of the -caine group are some of the most noxious. Cinchocaine, amethocaine, benzocaine, and a number of similar substances have no place as local applications in eczema; they are potent sensitisers, and they distract attention from the fundamentals of treatment, if by any chance they should appear to give temporary relief.

In the same category come the anti-histamine ointments, which have no curative effect on the eczemas, and whose antipruritic action should be reserved for insect bites. They are only weak antipruritics but they are powerful sensitisers.

If a patient's itch is severe enough to demand these local antipruritics, then what he really needs is rest and sedation; if he gets unduly clamorous, then it is possible that he is mentally ill and that he needs expert psychiatric as well as physical treatment. The really bad case of eczema, with gross œdema, generalised weeping, and severe exfoliation, is fortunately becoming rarer now that syphilis is being treated without arsenic, and gold is being recognised by the rheumatologists as one of the baser metals; but such patients can usually be relieved dramatically by the use of systemic cortisone or corticotrophin. I mention this parenthetically, lest anyone should think that I am advocating a policy of masterly inactivity, even in these severe cases ; their active treatment is anything but disappointing.

The administration of anti-histamines by mouth calls for some consideration, for it has been strongly advocated in the eczemas.

One may say at once that it does not fall into the same reprehensible category as the topical application of the same substances; but unfortunately the anti-histamines have no specific effect on eczemas however they are given. Their sedative action may be useful, but similar effects can be obtained at a fraction of the cost by the use of barbiturates, chloral, or bromides. In this connection it is worth noting that quite heroic doses of sedative may be needed: for instance, a husky man or hysterical woman with eczema can often take sodium barbitone gr. 10–15, or a corresponding dose of amylobarbitone, four or five times daily for some days before severe drowsiness supervenes.

At this point many will register strong disagreement: they have seen dramatic relief from the oral use of anti-histamines in eczema. I agree with this; it comes about in this way: eczematous people tend to have other allergic diseases, including urticaria; the wealing in urticaria can often be produced by damage to the skin; so a potentially urticarial subject who gets eczema may also have an urticaria, brought forth by each eczematous lesion, and by scratching. Therefore anti-histamines, which we all agree are effective in urticaria, are well worth giving by mouth in this sort of eczema, where we can see wealing.

But these are all rather minor details. Our patients may disappoint us, and be disappointed, for more general reasons.

First and foremost is the fact that skin lesions are visible; therefore more than ordinary powers of persuasion are needed to delude the patient into thinking he is cured if he isn't. Moreover, it is impossible to prevent his relatives, neighbours, and factory ambulance man from trying their hand at treatment, which makes our task very difficult.

Acting in the part of Cleopatra, Sarah Bernhardt stabbed the slave who bore to her the tidings of Mark Antony's defeat at Actium; she stormed, raved, wrecked some of the scenery in her frenzy, and finally, as the curtain fell, dropped in a shuddering convulsive heap. As the applause died, a middle-aged British matron was heard to say to her neighbour: " How different, how very different from the home life of our own dear Queen." It is well to remember that the patient's life is different from ours: he has not seen many dermatoses, and he and his friends fear them all. In virtually every case of eczema one must give an assurance that it is not infectious, and that it must not be subjected to homely therapeutic trials; and sometimes one should say specifically that it is nobody's fault, or even that it is not a venereal disease. These small assurances may save us from the frustration of attending a patient who seems to fear us: what he really fears is that we may have discovered something about his past, and that we won't tell him.

Lastly, unlike the general physicians, when we have failed to cure our patient, we cannot hand him to the surgeons for removal of the offending organ with the confident, cheerful, and very truthful assurance that he will be made worse before he is better.

It is often asserted that skin patients never get better, that they never die, and that the dermatologist never gets up at night. In defence of my craft, I can only plead that we have no monopoly of incurable patients, and that their immortality must do us credit. Getting up at night we regard only as a distressing symptom needing skilled investigation: we are proud and thankful that we do not suffer from it.

I am very grateful to Dr. H. J. Wallace and to the late Dr. J. M. Ellis for invaluable help in the preparation of this paper.

Conferences

LIVER DISEASE

THE annual meeting of the American Association for the Study of Liver Disease was held in Chicago on Oct. 31, with Dr. G. KLATSKIN (Yale) in the chair.

Acute Hepatic Necrosis

Prof. HEINZ KALK (Kassel, Germany) described a biopsy study begun in 1923. The first needle biopsy was made in 1934, and since then 4134 had been done, mostly under direct vision. More recently the liver had been photographed through the peritoneoscope. Professor Kalk emphasised the advantage of biopsy under direct visual control; blind biopsy might miss patchy or localised lesions.

He had seen more than 90 patients in hepatic coma. Most of them, unlike those in American and most British series, had acute hepatic necrosis; in 3 rather unusual cases, studied two, four, and six weeks after an episode of coma, the liver was normal. On the other hand he had also seen some patients whose livers showed scars of a preceding necrosis, but who gave no history of such an illness; this patchy scarring might easily be missed by blind biopsy. Such " scar " or " potato " liver was often associated with normal liver-function tests. These " scar " livers he believed to be clinically distinguishable from " cirrhosis ", but by biopsy alone the distinction was not always easy. In the acute stage of necrosis the liver was red and swollen with a rounded edge; later, scars appeared and in time became pale and shrunken, the surrounding liver remaining brownish. In his experience the left lobe was almost always more severely affected than the right; after recovery the right lobe might hypertrophy and overgrow an atrophic left lobe. In time necrotic tissue was replaced by non-specific granulation tissue; scarring resulted if the reticulin framework was destroyed, as the lobular architecture could not be replaced. Fibroblasts were then replaced by " scar " tissue, and the deeply grooved " potato ", or " scar ", liver resulted.

Once the episode of acute necrosis was past the prognosis was good, though transitory ascites might arise at four to six weeks. The real danger facing these patients was not progressive liver-failure but portal hypertension; fortunately they were particularly suitable for shunt surgery. In some patients a mixed lesion of " scar liver and cirrhosis " developed; and in these the prognosis was bad, the common end-result being hepatic coma.

Some patients had repeated small episodes of necrosis and scarring, leading to a final picture almost indistinguishable from Laennec's cirrhosis. In cirrhosis, however, he believed that the initial lesion was inflammation of the supporting-tissue at the periphery of the lobules, leading to secondary death of the parenchymal cells and a uniform, fine granulation. In acute necrosis, on the other hand, the primary lesion was death of the parenchymal cells in the centre of the liver lobules, followed by secondary scarring.

Cholestatic Jaundice

Dr. F. W. HOFFBAUER (Minneapolis) suggested that there could be no hard-and-fast rule as to whether cholangiography was necessary in the diagnosis of intrahepatic cholestatic jaundice (I.H.C.J.). If surgical assistance was decided on, he favoured a very limited incision under local anæsthesia, and cholangiography. A decision whether or not to proceed to laparotomy should be made in the light of the radiographic findings. Biopsy specimens must be taken from the liver at the beginning, not the end, of operation to avoid the histological appearance of " retractor hepatitis ".

Secretion of Bile

Dr. R. W. BRAUER (San Francisco) believed that bile was actively secreted by the parenchymal cells of the liver. The concentration of electrolytes was about the same in the bile as in the blood; but the concentration of bile-pigments and bile-salts was much greater in the bile than in the blood, and there were also more complicated molecules present, such as alkaline phosphatase and mucins. The bile canaliculi, he considered, did not behave like the renal tubules—i.e., they did not concentrate or actively secrete into the bile—but they did permit equilibration between capillary blood and bile so that small molecules such as water, salts, and glucose could move freely from bile to blood or in the reverse direction. Dr. Brauer concluded that in I.H.C.J. the primary lesion was in the membrane dividing the liver-cells from the bile canaliculi. Differential diagnosis from main-duct obstruction was difficult.

Dr. H. E. MACMAHON (Boston) thought that a definition of I.H.C.J. must include all cases with jaundice with no mechanical obstruction of the main bile-ducts and no active hepatic necrosis, and should exclude cases of Laennec's cirrhosis. This was not a disease entity but a syndrome comprising different conditions. Histologically there were two distinct stages: at first the bile-ducts proliferated; later they tended to become scarce and might even disappear altogether, as he had seen following the administration of chlorpromazine. The histological picture of I.H.C.J. could result from main-duct obstruction, besides cholangitis, cholangiolitis (or primary biliary cirrhosis), acholangitic jaundice, fibroxanthomatous jaundice, mucoviscidosis, occasionally carcinomatous and Laennec's cirrhosis, and hæmachromatosis. Clearly the histological diagnosis was difficult and could not be made by the pathologist alone.

Professor KALK said that in the initial stages of I.H.C.J. inflammation was conspicuously absent, and he preferred to call the condition a hepatosis.

Bile-duct Atresia

Dr. R. C. HARRIS (New York) had studied by serial biopsy 7 patients with intrahepatic bile-duct atresia. At birth the atresia was not complete, but by 2 years all bile-ducts had disappeared. Clinically these 7 cases fell into two groups. In 4 the course was of long-continued obstructive jaundice, and hypersplenism developed. The other 3 cases were more typical of cholangiolitis, and the blood-cholesterol levels were very high. Histologically there was little fibrous tissue in the portal tracts. This was either a disease of the ductules or possibly a metabolic error, perhaps similar to galactosæmia.

Aldosterone in Cirrhosis

Dr. J. M. STORMONT, Dr. S. J. WOLFE, Dr. B. FAST, Dr. J. CRABBE, and Dr. C. S. DAVIDSON (Boston) had found that patients with cirrhosis had a high urinary excretion of aldosterone compared with normals, but not higher than normals on a low-sodium diet. Amphenone was given in an attempt to inhibit aldosterone secretion. This drug produced mental changes similar to those in impending hepatic coma, but did not reproduce the typical electroencephalographic changes. Some protection against this side-effect was obtained by the simultaneous administration of prednisone. In 2 out of 4 patients the secretion of aldosterone was blocked, with consequent sodium diuresis; the other 2 patients did not respond, suggesting that other factors were involved in sodium retention in hepatic cirrhosis.

Hepatosplenography

Dr. J. G. TEPLICK and Dr. J. E. BERK (Philadelphia) discussed attempts to find a non-toxic medium for hepatosplenography. Barium sulphate given intravenously to rabbits and dogs outlined the liver and spleen clearly in two hours but could be readily detected in the reticulo-endothelial cells eighteen months later. Iodised oil 45%, emulsified in water with 'Tween 80', was also given intravenously to laboratory animals; this outlined the liver and spleen in about two hours and was clearing by five days. Toxic reactions were observed, though these were mostly minor and transient. If a smaller-particle emulsion (10–100 μ) could be prepared this might be a safe contrast medium for intravenous use.

Portal Hypertension

Dr. C. M. LEEVY and Dr. M. L. GLEIDMAN (Jersey City) had studied patients with portal hypertension by means of liver-biopsy and measurement of the wedged hepatic-vein pressure before and after medical treatment. Portal hypertension arising in the course of hepatitis and fatty liver responded rapidly, and œsophageal varices regressed as fat was mobilised from the liver. Corresponding with this there was an increase in the hepatic blood-flow. In patients with active cirrhosis the pressure might fall to normal and varices disappear; but not all patients showed this improvement and those who did not should be offered a portacaval shunt.

Wilson's Disease

Dr. J. M. WALSHE and Mr. S. B. OSBORN (London) reported their work with radioactive copper in Wilson's disease. Their results showed that penicillamine mobilised copper more powerfully than dimercaprol, that a normal person concentrated copper in the liver faster than patients with Wilson's disease, and that the specific activity of the urine copper fell sharply in the normal about the time cœruloplasmin-bound copper appeared in the circulation.

Dr. I. H. SCHEINBERG (New York) agreed that penicillamine was an extremely powerful " decoppering " agent, but its activity appeared to fall off after several months of continuous administration. He had treated 4 patients with it for nearly a year, and 2 had done well.

Liver-function Tests

Dr. G. M. MINDRUM and Dr. H. I. GLUECK (Cincinnati) reported that in most patients with cirrhosis and many with hepatitis the concentrations of factors V and VII were reduced, even when the prothrombin level, estimated by the one-stage method, was normal. In patients with severe cirrhosis and, temporarily, in patients with hepatitis the prothrombin level was often less than 50% of normal and did not respond to parenteral vitamin K. Using a two-stage assay for measuring " true " prothrombin, these workers found that this was an excellent prognostic test, especially if the two-hour response to vitamin K was measured. The test was not influenced by variations in the levels of factors V and VII.

Dr. K. S. HENLEY, Dr. H. S. WIGGINS, Prof. H. M. POLLARD, and Dr. E. DULLAERT (Ann Arbor) had estimated the transaminase content of parenchymal liver-cells. They made a suspension of parenchymal cells in citrate and estimated the levels of glutamic-oxaloacetic transaminase (G.O.T.) and

glutamic-pyruvic transaminase (G.P.T.). They found that the G.O.T. was mostly retained in the cells, while G.P.T. escaped into the suspending medium. This correlated well with the clinical observation that estimation of G.P.T. was a better index of liver injury than estimation of G.O.T.

Dr. C. L. STERKEL, Dr. J. A. SPENCER, Dr. S. K. WOLFSON, and Dr. H. G. WILLIAMS-ASHMAN (Chicago) had studied serum-isocitric-dehydrogenase (I.C.D.) levels in patients with liver disease and compared these with serum levels of G.P.T. and lactic dehydrogenase (L.D.). In patients with acute hepatitis, the serum-I.C.D. was much increased; this increase was not found in other forms of hepatic disease except cases of extensive carcinomatous infiltration of the liver. With recovery the serum-I.C.D. returned to normal. The serum levels of L.D. followed no such consistent pattern. The G.P.T. was also increased in acute hepatitis only, and returned to normal with recovery. The advantage of the I.C.D. determination was that it was easier and more specific for liver damage; the level had proved to be normal in 250 other patients with a wide variety of disease-states.

Medicine and the Law

The N.H.S. Tribunal

SOME interesting, and on the whole encouraging, facts are given in the report of the chairman of the National Health Service Tribunal for the three years ending six months ago.

The tribunal's main function is to consider representations that the continued inclusion of a practitioner—i.e., doctor, dentist, chemist, or optician—in the appropriate list would be prejudicial to the efficiency of the service. It also has the secondary function of considering applications for reinstatement.

During the three years 13 new cases arose in which it was asked to direct the removal of a practitioner from the appropriate list, and all 13 requests came from executive councils. In addition, it received 8 applications for reinstatement. This total of 21 cases compares with 33 for the period 1948–51 and 29 in 1951–54.

The total number of cases actually dealt with by the tribunal in 1954–57 was 23: some had been carried forward from the previous triennium, and some had not been finally disposed of by July 4, 1957. In 6 cases, the tribunal directed the removal of the practitioner's name from the list, but in 5 others the case was withdrawn on the practitioner undertaking not to practise under the N.H.S. There was only one appeal to the Minister, and that failed.

The 6 cases in which the tribunal directed the removal of a practitioner's name included 3 doctors.

The chairman, Sir Reginald Sharpe, Q.C., welcomes two recommendations of the Franks Committee on Administrative Tribunals and Inquiries. These are that the right of the practitioner to appeal from the tribunal to the Minister should be abolished, and that the appeal from the decision of the executive council in minor cases should lie to the tribunal instead of to the Minister as at present. This latter recommendation, if put into effect, will much increase the tribunal's work: between 1950 and 1954, the number of appeals from executive councils to the Minister averaged 125 yearly. The addition of this amount of work would clearly make the tribunal much less of a part-time body than at present; but on the whole it seems preferable that such appeals should be dealt with by a properly constituted tribunal with recognised rules of procedure rather than by an official of the Ministry, however capable and impartial.

Sudden Illness and Dangerous Driving

At 10.45 one evening, a man drove his motor-van across a road junction at a fast speed and came into collision with a car. The van then carried on for a short distance and overturned. On a charge of dangerous driving the defendant contended that he became unconscious as a result of being overcome by a sudden illness and that he was not therefore liable at criminal law. The Justices found that the defendant must have exercised skill in driving in order to reach the road junction, but they were of opinion that by the time he reached that point he was not capable of forming any intention as to his manner of driving, and they dismissed the charge. The prosecutor appealed.

The LORD CHIEF JUSTICE, giving judgment, said that the Road Traffic Act, 1930, contained an absolute prohibition against driving dangerously and no question of intention entered into the offence. The Justices probably meant that the defendant was in a state of automatism, but the defendant's evidence was consistent with his being overcome with sleep and falling asleep was not a defence to dangerous driving. There was no evidence that he was suffering from anything amounting to a "blackout" nor that he had ever had such an attack before. Accordingly, the appeal would be allowed.

Mr. JUSTICE DEVLIN, agreeing, said that if the onus lay on the defence to produce some evidence of automatism, they had failed to do so, with the result that the Justices had come to a wrong conclusion in law. The defendant had not set up a defence of insanity, and unless there was evidence which showed that his irrationality was due to some cause other than disease of the mind the Justices were not entitled simply to acquit.

Mr. JUSTICE PEARSON, agreeing, said that if the defendant was driving at all he was driving dangerously, therefore the question was whether he was driving. Normally, a person in the driving-seat of a car was, prima facie, driving unless there was evidence to show that he was rendered unconscious or otherwise incapacitated from driving the car. For example, the person has an epileptic fit or is reduced to a state of coma or is completely unconscious through the onset of some disease; or he is stunned by a blow on the head by a stone thrown up from the road, or he is attacked by a swarm of bees, so that he is prevented from exercising any directional control over the car. In each case he would not be driving. If a man falls asleep in the driving-seat, after he has fallen asleep he is no longer driving, but at the point at which he is falling asleep he is failing to perform a driver's elementary duty of keeping himself awake and so is driving dangerously. Similarly, if a man knows he is liable to have an epileptic fit, but nevertheless drives, it is a question of fact whether driving, in the circumstances, could be considered dangerous. The answer might depend on the degree and frequency of the epilepsy. Here there was evidence that the defendant was driving, and if the burden of proof was on the defence they failed to prove an extraordinary mischance rendering it impossible for the defendant to control the car or direct its movement.

HILL v. BAXTER. *Queen's Bench Division (Divisional Court)*: Lord Goddard, *C.J.*, Devlin and Pearson, *J.J.*, Dec. 19, 1957. Counsel and solicitors.—Anthony Harmsworth (Sharpe, Pritchard and Co., for town clerk, Brighton): John Allcott (Jolly and Co., Brighton).

J. D. PENNINGTON
Barrister-at-Law.

In England Now

A Running Commentary by Peripatetic Correspondents

Now is the time for all fat men (and women) to come for the aid of their doctor. Having clambered on and off their weighing-machines with wheezings of horror, gastronomic recidivists occupy most of one's after-Christmas consulting-room space and time decrying the injustice of the Great Scheme of Things.

A doctor whose lunch has consisted of answering the telephone through a mouthful of antacid tablets is tempted to be cool with these beach-ball-like malcontents who plough through the menu sideways as well as downwards, and yet swear by all their Metabolites that they eat nothing at mealtimes and less than that in between. After these unlikely and interminable affirmations they depart, their toffee-papers drifting after them like autumn leaves behind a bus, while the exhausted physician remembers wistfully 'Fatty' Cortez, who, stout as he was, at least stood silent on top of his peak in Darien—if only because he was out of breath.

The treatment of such aggrieved and adipose clients varies, because if the doctor is himself dyspeptic or recovering from seasonal roisterings, the patient is liable to collect a diet that would make a hunger-striker feel he was outraging the Sumptuary Laws. (More subtle is the prescription of a menu so recherché that an import licence becomes necessary and the foodstuffs so abominably expensive that the patient loses weight worrying how to pay for them.) It should be remembered that patients also lose weight if their food is rendered inedible, and it is not difficult to suggest to them an itinerary which includes hotels whose cooperation in this respect can be relied upon.

I remember a squadron mess in 1946 where for this reason we all lost considerable weight, and the mess secretary's solution was to engage a civilian who claimed to have been cook to Field-Marshal Montgomery. Twenty-four hours and an attack of gastroenteritis later he confessed that *his* Field-Marshal Montgomery was an East Coast trawler.

* * *

Now that radio brings its annual deluge of Christmas greetings from all parts of the world, the basic similarity of this great festival in different lands cannot pass unnoticed. Certainly, in America, celebrations have a very English flavour. You have the same feverish preparations, parties, carols, and traditional turkey. This year proved exceptional in only one respect, for the sun shone brilliantly in a still blue sky. Against this summer background, it was difficult to accustom oneself to heavily decked Christmas trees. But at night, when the soft glow of coloured candles brought warmth and friendliness to hundreds of windows in every street, and the strains of *Good King Wenceslas* could be heard in the distance, the weather no longer seemed to matter.

* * *

When, a few days before Christmas, a parcel labelled "football" arrived for Jonathan (aged $10^{1}/_{2}$), I thought it prudent to inspect the contents before passing them on to Santa Claus for delivery. My prudence was justified, for the parcel contained an obviously very fine and expensive (association) football in a state of collapse. After struggling with and breaking the frayed suture I managed to extract the bladder; in doing so I removed the skin from the backs of three of my fingers and a portion of what appeared to be a collar from the neck of the very special seamless bladder. An exciting few minutes were then spent, fruitlessly, trying to inflate the bladder with my car foot-pump. Next morning I took the football, bladder and all, to a well-known sports shop in the West End, and asked the muscular young assistant to put it into working order. He looked at me with scorn. "We don't blow footballs up here, sir," he said. "Not even on Christmas Eve?" I asked. "No, and you won't get very far with that bladder." Besides a part of the collar, I had removed a section of the bladder wall.

When I had bought a new bladder, an adaptor for filling the bladder from a pump, a new suture looking like a biterminally amputated bootlace, and a large blunt needle for lacing up the latter, I had spent enough for quite a handsome present for Jonathan, but I felt well equipped to cope with the situation. Arriving at hospital, I met a younger colleague who a year or so ago had been one of the stalwarts of the United Hospitals soccer team. Just the man for the job, I thought, and handed him the football and my purchases. It took him an hour and a half, with the aid of the laboratory motor pump, to assemble the football ready for use.

At 2 a.m. on Christmas morning I was awakened by a musical tinkling. A late carollers' percussion band? No, just the football sailing out of the children's bedroom window.

* * *

I rang up the clinic and asked for an urgent appointment for that afternoon. The first thing the secretary wanted to know was the patient's name; I countered by saying that I first of all wanted to know if it would be possible for her to be seen that day, regardless of what her name might be. To this the secretary replied that it all depended on whether or not her surname began with any letter between A and K as they had a new system. I could not help but reflect on the marvels of modern medicine when the urgency of a complaint could be influenced by the chance of one's initials.

* * *

Quid pro quo is the basis of our relationship with Joe. He is our plumber and I look after his dad.

The trouble with our house is that four generations of doctors have lived in it. The earlier three were either pioneers of the do-it-yourself movement or victims of evolutionary skill in Joe's forebears. The trouble with Joe's dad is that corrosion and hard waters have played hell with his own piping systems, which are also of the 1875 vintage. Our intercepting trap in the front garden vies with the old boy's prostate for retention symptoms. His long-standing hyperpiesia contrasts with the chronic low pressure in our lavatory cistern. Joe and I often shake our heads over the imperfection of each other's professional responsibilities. Mind you, we do deliver the goods from time to time. Ten minutes' work with a set of drain rods or a Higginson syringe can provide thankful relief for both of us. Joe's skilful version of an unwanted teddy bear to bring down a leg round the bend made him all square for a similar little job I did for their Elsie. It does not pay us to be too critical of the ins and outs of each other's households.

Most of our common problems have been physiological, and restoration of function has been our guiding principle—removal of physical obstruction, speeding the circulation, adjusting the pressure on valves and cisterns, soothing the intima, relieving the air-locks and gases, heat-exchange systems, and temperature regulators. But physiology cannot take us all the way, and this week anatomy reared its ugly head.

Our kitchen range packed up, and my better half wants one of those newfangled stoves put in the opposite corner of the room. We handed the place over to Joe, and went to cook snacks over a bunsen in the dispensary. Someone was fairly letting fly in the back regions, and then there came a knock on the surgery door. Joe requested a domiciliary consultation in the kitchen, so down I went. The extent of the laparotomy was more worthy of a necropsy than an operation with a hopeful prognosis. The scene was vaguely familiar: pipes everywhere, swabs and buckets, overalls and puddles, even to the tea on the trolley. Joe was worried about that there big pipe in the middle: it did not seem to go nowhere, and maybe only his great-grandad knew where it came from: but it was certainly too much in the way in 1957. I suggested radical excision. Joe looked horrified, for empiricism was not his line. Impatiently I snatched a pickaxe from the floor and buried its point into the lumen of the mystery aorta. A trickle of rusty fluid seeped out, but nothing more untoward happened. I commanded Joe to cut the section out and hammer up the patent foramina in the wall. We have known each other too long for him to disobey, but he gave me a nasty quizzical look. If our village gets snowbound again this winter, I doubt if Joe will let me pick up a scalpel to his dad. He distrusts my modus operandi.

Letters to the Editor

COLITIS FROM GANGLION-BLOCKING DRUGS

SIR,—Kitchin et al.[1] refer to diarrhœa as a troublesome complication of treatment of hypertensive patients with mecamylamine. This side-effect needs to be stressed because the ganglion-blocking drugs are generally believed to produce constipation, and hence may be overlooked as the cause of diarrhœa. Their continued administration may have disastrous results.

In the past few years we have encountered three cases of severe diarrhœa and shock in patients treated for a long time with oral pentolinium.

The first patient died after operation and at necropsy was found to have a large sloughing ulcer of his cæcum and ascending colon. A second patient was found at operation to have a gangrenous cæcitis, which was treated by cæcostomy. She recovered after a stormy illness. A third patient developed similar features, but began to improve with the prompt cessation of the ganglion-blocking drug and the administration of intravenous fluid and electrolytes. Her symptoms recurred after she was given, inadvertently, another dose of the drug. She eventually recovered.

This severe bowel disturbance was tentatively attributed at first to a high concentration of the ganglion-blocking drug in the bowel, and therefore seemed less likely with a drug which was rapidly and completely absorbed in the upper part of the small bowel, as was presumed to occur with mecamylamine. However, there are indications that mecamylamine may also cause colitis.

We have recently encountered in a patient under treatment with mecamylamine severe diarrhœa and shock leading to anuria and death. At necropsy there was widespread ulceration of the large bowel. Another patient taking mecamylamine developed severe diarrhœa which became so bad as to amount to fæcal incontinence. This stopped two days after she ceased taking mecamylamine.

The ganglion-blocking drugs have now proved their worth in the treatment of severe hypertension, but it is prudent to remember also the dangers of their use and to take these into account, particularly before embarking on treatment of patients with the milder forms of hypertension.

A. J. BARNETT.
Associate Director,
Clinical Research Unit.

Alfred Hospital,
Melbourne, Australia.

SANATORIA BEDS

SIR,—A year has passed since my plea [2] for the preservation of the small sanatoria was published in your correspondence columns.

This year has seen a further drop in the number of patients requiring or willing to accept sanatorium treatment for tuberculosis. Nowadays admission to sanatorium is rarely indicated. A spell of a few weeks following diagnosis to teach the patient how to take the drugs, and see they are tolerated, is useful, particularly with the less intelligent patients. Seriously ill patients with tuberculosis are not often seen, but would have to be admitted, as would the homeless, the vagrants, and those who prove too difficult to manage at home.

Undoubtedly all these groups of patients are much better handled in small sanatoria than in the large institutions, which tend to have strict rules and regulations that prove irksome to patients who, in the vast majority of cases, feel well. Should the rules and regulations be broken the patient may be discharged and refused admission in the future. Furthermore, the traditional "dos and donts" taught in these institutions, which have little scientific basis, tend to induce a state of hypochondriasis in certain patients.

Surely efforts should now be made to close the large sanatoria which are showing an increasing number of empty beds, but which interested parties and ill-informed administrators strive to maintain. Sentiment should be disregarded in this matter, as many of these larger units could be readily adapted as general hospitals or geriatric units, for which the need is so much greater.

The more homely atmosphere and less stringent regulations of small units would more than compensate for the possibly slightly increased cost per bed and, furthermore, would prove easier to adapt to the changing needs of tuberculosis.

Bournemouth. O. D. BERESFORD.

CHEST X-RAY EXAMINATIONS AND RADIATION HAZARDS

SIR,—I have read with interest the article by Dr. J. B. Clark and Dr. R. Grenville-Mathers (Dec. 21). But is it not "straining at a gnat and swallowing a camel" to concern ourselves unduly with the use of chest X-rays for diagnostic purposes in chest clinics whilst patients undergoing treatment by an artificial pneumothorax or, worse, an artificial pneumoperitoneum are subjected weekly for a period of years to fluoroscopic examination involving a dose of radiation greater than that received during almost all diagnostic chest X-rays (excepting, of course, tomography)? All the greater is the alarm when one recalls hearing the advice given casually "Give him a P.P." rather than do nothing.

Hastings. A. W. ANDERSON.

RESPONSE OF MEGALOBLASTIC ANÆMIA TO PREDNISOLONE

SIR,—The article of Dr. Doig and his colleagues [1] on the effect of prednisolone in megaloblastic anæmia was of interest, since I have investigated the effect of adrenal corticosteroids on the absorption of vitamin B_{12} in several patients with pernicious anæmia. It seemed worth while to evaluate the action of the corticosteroids, since a beneficial effect could explain the spontaneous remissions of pernicious anæmia that have been described.[2]

One patient with pernicious anæmia in relapse received 40 mg. of prednisone daily for 2 weeks. There was no hæmatological response, the bone-marrow remained megaloblastic, and the serum-vitamin-B_{12} level of 0 $\mu\mu$g. per ml. remained unchanged. The fæcal excretion of radioactive ^{60}Co B_{12} in this patient was 98% before prednisone and 86% while receiving prednisone. In three additional patients with pernicious anæmia in remission, the fæcal excretion of ^{60}Co B_{12}, compared with control studies, was decreased by 9–12% while receiving corticosteroids.

There are several mechanisms by which the corticosteroids might produce a remission of megaloblastic anæmia due to vitamin-B_{12} deficiency—by a direct effect on the bone-marrow, by increasing the secretion of intrinsic factor, or by facilitating the absorption of B_{12} by a presumed non-specific effect on the intestinal mucosa as in the treatment of idiopathic sprue.

The decrease in fæcal excretion of radioactive B_{12} found in the patients receiving steroids is small, but may

1. Kitchin, A., Lowther, C. P., Turner R. W. D. *Lancet*, 1957, ii, 605.
2. Beresford, O. D. *ibid*, 1956, ii, 1109.

1. Doig, A., Girdwood, R. H., Duthie, J. J. R., Knox, J. D. E. *Lancet*, 1957, ii, 966.
2. Bloomfield, A. L. *Stanford med. Bull.* 1944, **2**, 5.

be significant. A slight increase in the absorption of vitamin B_{12} could result in the delayed hæmatological response observed by Doig et al. Obviously, further studies are necessary to elucidate the action of corticosteroids in megaloblastic anæmia due to vitamin-B_{12} deficiency.

University of Louisville
School of Medicine. THOMAS D. STEVENSON.

INTELLIGENCE OF DRIVERS

SIR,—On each of two recent journeys on the Great North Road I found a large motor-van coming towards me in my lane on a dual carriageway which, though recently opened, was properly marked. The lack of perception on the part of their drivers calls to mind the number of drivers of goods, and even public-service, vehicles who failed to reach the standard on psychological tests required by the Army during the late war.

Mental subnormality in a driver is a more serious matter than is generally realised. At present a mental defective under any form of statutory care is debarred from holding a driving licence—provided he writes "no" in the proper place on a form which has already provided the basis for a satirical sketch on B.B.C. television and is probably as clear to him as an income-tax form is to some of the rest of us. Once discharged from statutory care this same defective can apply for his driving licence, and, unless the licensing authority has been informed of the circumstances, get it.

It is to be hoped this subject will receive proper attention in the legislation which is to follow the report of the Royal Commission on the Law Relating to Mental Illness and Mental Deficiency. But what of those still dangerously lacking in mental ability who escape the notice of the authorities?

Northgate and District Hospital,
Morpeth, Northumberland. C. GUY MILLMAN.

PEPSINOGEN IN URINE AND BLOOD

SIR,—Your annotation (Oct. 19) touches many aspects of this fascinating subject and invites comment. As one who, you suggest, put forth the claim that uropepsinogen excretion quantitatively reflects gastric pepsin output, may I make a comment?

The entrance of pepsinogen both into the lumen of the stomach and into the blood, whence it finds its way into the urine, represents only one example of what Dr. Hollander and I [1] have elsewhere called the exocrine-endocrine partition of digestive enzymes. The evidence regarding this partition ratio was of a statistical nature, but, more important, the evidence was obtained under clearly defined basal conditions. This latter point is often overlooked in the by now voluminous literature on the subject.

The studies by Hirschowitz et al. to which you refer are valuable for exploring the effects of corticotrophin and cortical steroids on this exocrine-endocrine partition. Recent work by Rider and colleagues [2] indicates that irradiation of the stomach may alter this partition, and Spiro et al.[3] have emphasised the effects on it of inflammatory lesions of the stomach.

All these investigations have enlarged the number of variables which must be taken into account, but do not necessitate "complete revision of ideas on the relation of these levels to gastric pepsin output." They cannot invalidate the many articles, some cited in your annotation, which document the clinical usefulness of this measurement.

Mount Sinai Hospital,
New York. HENRY D. JANOWITZ.

1. Janowitz, H. D., Hollander, F. *Gastroenterology* 1951, **17**, 591.
2. Rider, J. A., Moeller, H. C., Althausen, T. L., Sheline, G. E. *Ann. intern. Med.* 1957, **47**, 651.
3. Spiro, H. M., Friedman, E., Poliner, J. J. *Clin. Res. Proc.* 1957, **5**, 196.

THE REINFORCEMENT OF TENDON-REFLEXES

SIR,—To reinforce, say, an ankle-jerk, ask the patient to hook the fingers of his two hands into each other and tell him that you are about to ask him to pull one hand hard against the other. Then say "Are you ready?" Then, without giving the expected command, strike the Achilles tendon, and you will obtain as much reinforcement as if you had given the command.

That is what I was taught years ago, and I have proved the truth of it many times, or at least I think I have. Perhaps, relying on clinical impressions, I have deceived myself. In the excellent paper by Dr. Buller and Dr. Dornhorst (Dec. 21), it would have been valuable to have fig. 3 supplemented by tracings to show the reflex 0·2 or 0·3 seconds after the mere inquiry "Are you ready?" If reinforcement were demonstrated, it would not invalidate these authors' view of the role of the small motor nerves; but it would, I think, invalidate their statement that there has to be a movement involving effort.

London, W.1. JOHN PENMAN.

B.P. AND PROPRIETARY PREPARATIONS

SIR,—The time is ripe for reassessment of the policy of the Ministry of Health and Treasury in regard to proprietary medicines. The report of the Cohen Committee (which is the basis of official policy) concedes that the pharmaceutical industry has contributed a (comparatively) small number of outstanding drugs not yet in the *B.P.* Apart from these, everything *B.P.* is "good enough", and there is no need for manufacturers to introduce "slight variants" (to quote a recent critic) of official remedies.

Such an attitude is contrary to the whole course of scientific and industrial advance. Progress does not consist only in a few outstanding discoveries, but also in the cumulative effect of a host of small advances and improvements. As I have pointed out elsewhere, the motorcar of today does not differ fundamentally from its predecessor of fifty years ago: 4-stroke engine, carburettor, clutch, gear-box, transmission, differential, &c. But in performance and comfort it has been transformed by constant modification and improvement in detail. Similarly in pharmacy. Progressive manufacturers are continually seeking to produce "something better" than *B.P.* They spend large sums, not only on fundamental research to discover new drugs, but on formulation research and process research to find better ways of making, using, and combining existing drugs. Modern drugs are extremely complex and often yield their maximum efficacy only under carefully controlled conditions. A wide range of new excipients have been introduced, affording immense scope for experiment and modification. The effect of a medicine is not measured by the percentage of the active ingredient. The choice of excipient, the physical state of the ingredients, and other factors may materially enhance the drug's therapeutic efficacy. To give only one illustration: there are no less than three hundred different emulsifying agents at the disposal of the manufacturer from which to select the one best suited to a particular purpose.

The Pharmacopœia Commission have not the staff or resources to do much research. Advances come almost invariably from the industry's research laboratories, and may be reflected in *B.P.* standards and formulations some years later.

The existence of standards, whether *B.P.* or B.S.I., is a challenge to a manufacturer to go one better; and it would be a bad thing for medicine, for the N.H.S., and for the export trade if this were not so.

It is really time that the Ministry and its fellow critics ceased to represent the *B.P.* as "best possible", and took to heart the conclusion in Mr. J. P. Martin's recent book

Social Aspects of Prescribing that, in selecting proprietary medicines as the principal cause of the high cost of the pharmaceutical service, they are barking up the wrong tree.

In a world which is becoming increasingly proprietary-minded the constant denigration by the Ministry of British proprietary medicines may react to the detriment of British exports.

Horsham, Sussex. F. F. MARCHBANK.

LEAD POISONING

SIR,—Dr. Gillet in his letter of Dec. 14, referring to my article of Nov. 30, has asked for evidence of the route of entry of the lead.

No direct evidence was obtained. Ample opportunity for ingestion and inhalation existed. Because inhalation is generally regarded as more toxic, this route was considered the more important.

Some confirmation of this seems indicated by the fact that the husband and two elder boys who spent little time in the shack presented no evidence of lead absorption, but the wife and younger children who spent more time in the shack did.

As far as contamination of food goes, all members of the family would have been at somewhat equal risk.

Department of Public Health, Perth, Western Australia. W. S. DAVIDSON.

CONTROL OF ARTIFICIAL RESPIRATION IN POLIOMYELITIS

SIR,—Dr. Walley's paper of Dec. 7 raises a number of interesting points in the application of intermittent positive-pressure respiration (I.P.P.R.). One which has had little attention to date is the interaction, under these conditions, of respiratory factors with metabolic processes in the acid-base balance of the body.

Case 1 of Dr. Walley's series was clearly in a state of respiratory acidosis due to pulmonary atelectasis. This was corrected. But the figures cited for blood pH, carbon-dioxide tension, and total carbon dioxide show that the patient then passed, perhaps insidiously, into severe metabolic acidosis. Death was stated to have been from anuria.

Metabolic acidosis associated with renal failure is by no means an uncommon cause of death among patients undergoing I.P.P.R. The factors contributing to it have yet to be fully understood. The acidosis may result not only from abnormal metabolic events, such as ketosis in the initial stages of the illness, but also from impairment of the renal mechanisms which sustain the normal pH of the blood.

In conditions which require long-continued artificial respiration an extra burden is imposed on renal function in two ways. Firstly, the inevitably increased catabolism of tissue protein requires the excretion of an excess of nitrogenous degradation products. This osmotic load may be further reinforced by injudicious feeding with high-protein mixtures. Secondly, fixation of the ventilatory volume to a predetermined empirical figure eliminates the partial respiratory compensation which normally follows a metabolic disturbance of the plasma-bicarbonate level.[1] Hence there must be increased strain on the renal pH-regulatory mechanisms.

The elasticity of renal function may be further reduced by anoxæmia, by toxæmia, and possibly also by changes in the visceral venous blood-flow due to hæmodynamic "back pressure" from the positive endobronchial pressure used for respiration. There is some evidence that hepatic function may be modified by this back pressure.[2] A high inflating pressure or a shortened expiratory pause, either of which may be needed to maintain an increased respiratory minute volume, results in a raised mean intrathoracic pressure.

Disturbances of electrolyte balance can occur in a variety of conditions which may necessitate artificial respiration. Suppression of urinary excretion of the sodium and chlorine ions has been described in bulbar poliomyelitis and other intracranial lesions,[3] and of the chlorine ion in tetanus.[4] If present, these disturbances add to the complexity of the metabolic picture.

Dr. Walley has rightly emphasised the importance of blood-gas analysis in the control of long-continued artificial respiration, and in so doing has pointed to other problems.

The Poliomyelitis Unit, Infectious Diseases Hospital, Portsmouth. M. W. GLOSSOP.

1. Gamble, J. L. Chemical Anatomy, Physiology and Pathology of the Extracellular Fluid. Cambridge, Mass., 1954.
2. Astrup, P., Gøtzsche, H., Neukirch, F. *Brit. med. J.* 1954, i, 780.
3. Allott, E. N. *Lancet*, 1957, i, 246.
4. Glossop, M. W., Low, M. D. W. *Brit. J. Anæsth.* 1957, **29**, 326.

PRODUCTION OF FIBRINOLYTIC ACTIVITY WITHIN ARTERIES

SIR,—May we reply briefly to Prof. McFadzean's letter of Dec. 21?

Firstly, we apologise if our reference to his and his colleagues' work was misleading.

Secondly, Professor McFadzean believes that local anæsthesia increases fibrinolytic activity in the vessel from which blood is obtained. In our investigation a local anæsthetic, lignocaine, was used for the arterial punctures, no anæsthetic being used for venepuncture. Since we found arterial-blood fibrinolytic activity to be less than venous-blood fibrinolytic activity, we do not see that the second part of Professor McFadzean's letter is relevant to our findings.

Finally, we have tested venous-blood fibrinolytic activity with and without lignocaine anæsthesia, and find no difference.

Gloucestershire Royal Hospital, Gloucester. G. R. FEARNLEY
J. FERGUSON.

RADIATION AND LEUKÆMIA

SIR,—The report[5] by Court Brown and Doll on "leukæmia and aplastic anæmia in patients irradiated for ankylosing spondylitis" is outstandingly valuable for the estimate that it gives of the increasing incidence of leukæmia with increasing radiation dose in these patients. It has in addition, however, been regarded as indicating the probable absence of a threshold for the induction of leukæmia by radiation, despite the authors' warnings that their information on this point was inadequate to justify a definite conclusion.

In view of the importance of this subject it would be valuable to have the authors' estimate of their evidence on this question. It is obvious that the regression line used in the report is inappropriate to a study of possible thresholds since it is "calculated from the rates for the (various) dosage groups . . . and made to go through the point corresponding to the incidence in the absence of treatment." It would, however, be valuable to know the line of best fit to the points for the irradiated patients only; and so to obtain an estimate for the dosage at which the incidence of leukæmia is no greater than in unirradiated subjects. It is clear that such an estimate of a "threshold" may be highly inexact and the confidence limits of the estimate would be helpful in demonstrating this. It is clear also that no reliable deduction can be made by the extrapolation of a regression line in this way. The need, however, is to assess what inferences as to the likely size or existence of a threshold are indicated, and what are

5. *Spec. Rep. Ser. med. Res. Coun., Lond.* 1957, no. 295; see annotation, *Lancet*, 1957, i, 1130.

probably excluded, by the observations on which the report is based.

Department of Clinical Research,
University College Hospital Medical School,
London, W.C.1. E. ERIC POCHIN.

NITROUS-OXIDE BYPASS ON ANÆSTHETIC APPARATUS

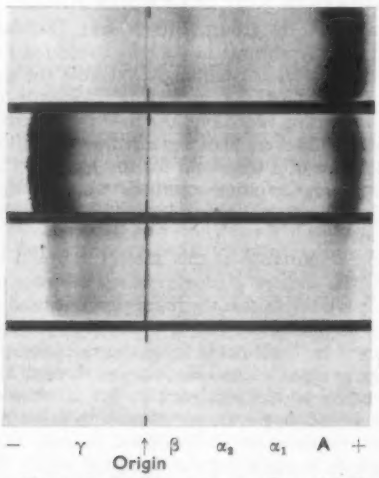
SIR,—There are still numbers of anæsthetic machines in use which have a bypass providing a rapid flow of nitrous oxide as well as one for emergency oxygen. The two controls are alike, though at opposite ends of the row of flow-meters. It can easily happen in the stress of an emergency that the wrong bypass is opened when it is intended to inflate a patient's lungs with oxygen. At least one fatality has been caused in this way. I suggest that lives may be saved if every anæsthetist who uses a machine that has a nitrous-oxide bypass takes steps to have it removed.

Cambridge. H. R. YOUNGMAN.

UNUSUAL URINE PROTEIN IN MYELOMATOSIS

SIR,—Mr. Cummings,[1] in describing the urinary-protein electrophoretogram from a case of myelomatosis in which there were three bands in the γ-globulin region, reported that this was the only instance in some 40 cases in which he had found more than one band in this region. In Dr. Gobert-Jones' case [2] two bands were present in the γ-globulin region.

We have recently investigated a patient in whose urine there are apparently four distinct proteins. The electrophoretic pattern shows two distinct bands in the region corresponding to the γ-globulins, a fainter one in the region corresponding to the β-globulins, and a fourth which is albumin (see fig.).



Electrophoretograms.—α_1, α_2, β, γ-globulins; A, albumin.

A man, aged 47, presented with aching limbs and symptoms of anæmia. In addition to the urine and serum findings, smears of a marrow aspirate and radiographs were typical of multiple myelomatosis. The urines were concentrated ten times by freeze-drying and resolution in 0·05 *M* barbitone buffer (pH 8·6). Both the urines (0·05 ml.) and sera (0·01 ml.) were electrophoresed on Whatman 3 mm. paper in a horizontal bath using 0·05 *M* barbitone buffer (pH 8·6) for thirteen hours at a current of 1·2 milliamps per strip.

1. Cummings, A. J. *Lancet*, 1957, ii, 598.
2. Gobert-Jones, J. A. *ibid.* p. 1068.

We are at present studying the relative value of different urine tests in differentiating myelomatosis proteinuria from that found in other conditions. As an aid to our study we would welcome specimens of urine containing protein from cases of proved or suspected myelomatosis.

H. J. WOODLIFF
R. W. AINSWORTH
Department of Medicine,
University of Cambridge. R. J. FLEMANS.

TROPICAL EOSINOPHILIA

SIR,—In their preliminary communication of Sept. 7, Dr. Gault and Dr. Webb reported what appears to be the anterior end of a nematode larva in the liver in a case of tropical eosinophilia; they have also shown gross pathological changes in the liver.

It is increasingly being realised that, in tropical eosinophilia, tissues other than the lung are commonly affected. Chaudhury,[1] in his series of 167 cases of tropical eosinophilia, noted enlargement of the liver in 52 cases, symptoms other than pulmonary (mainly gastrointestinal) in 42, splenomegaly in 14, and enlargement of lymph-nodes in 5. Gupta and Rao [2] have reported eosinophilic nodule of the breast in a case of tropical eosinophilia.

The work of Danaraj et al.[3] with a filarial complement-fixation test, and that of Gault and Webb, strongly support the view that parasitic infection plays an important part in tropical eosinophilia, and that most of these cases are probably of filarial origin. Filariasis exhibits itself in a wide variety of diverse and apparently unrelated clinical conditions. Apart from the well-recognised clinical features, various other manifestations, such as mastitis, parotitis, thrombophlebitis, rectal bleeding, pruritus, erythematous or papular eruption, have been thought to be due to filarial infection[4]. Janssens [5] noted various nervous and psychic manifestations of filariasis. This variety of clinical conditions may be explained on the basis of lymphatic blockage and vascular allergy.

It seems, therefore, that tropical eosinophilia is just one of the many manifestations of filariasis. In spite of the fact that filariasis is so widely prevalent, our knowledge of the disease is woefully deficient.

Hasanabad Lane, Near Market,
Santacruz, Bombay, 23. B. S. RAHEJA.

A FUNCTIONAL NECESSITY

SIR,—Once again *The Lancet* has advocated the permanent creation of a new grade of hospital doctor intermediate between senior registrar and consultant. The letters of Mr. Holmes Sellors, Dr. Rowland Hill, and Professor Strachan must have made it clear that the representatives and leaders of the consultants are opposed to such a plan. I should like you to know that the same is true for the senior registrars and registrars. The B.M.A. Hospital Junior Staffs Group (formerly Registrars Group) provides representative machinery to which all members of these grades have access, and the problem of hospital staffing has been our chief concern for the past four and a half years. Everywhere and always, the majority opinion has been against a permanent subconsultant grade. Of course, there are some now in urgent distress, men around 40 in the major specialties, with higher qualifications, long specialist experience, and satisfactory records who are threatened with dismissal. Plans for a subconsultant grade may tempt some of them as a straw tempts a drowning man. If a few should even clutch at it, that would not be an argument for providing straws

1. Chaudhury, R. N. *J. Indian med. Ass.* 1956, **27**, 195.
2. Gupta, I. M., Rao, M. S. N. *Indian J. med. Sci.* 1957, **11**, 728.
3. Danaraj, T. J., daSilva, L. S., Schacher, J. F. *Proc. Alumni Ass. Malaya*, 1957, **10**, 109.
4. Raheja, B. S. *Antiseptic* (in the press).
5. *Ann. Soc. belge Méd. trop.* 1952, **32**, 229. See *J. Indian med. Ass.* 1954, **23**, 269.

instead of proper lifesaving gear. Nor would the fact that straws are cheaper.

In considering plans for future hospital staffing much confusion arises unless it is recognised that there are two quite separate problems. An immediate solution is needed to mitigate the hardships of the ageing time-expired senior registrar and this must be followed by a long-term solution which will ensure that similar hardships, or others as bad, do not occur again. It is absolutely vital that the short-term plan should be consonant with the long-term one, and that the long-term one should be based on serious consideration of what is best for the hospital service, not dictated by the short-term plan. To do otherwise is to sacrifice the future to the present.

You do not clearly define the grade of assistant consultant which you propose. Evidently it is to be a permanent feature of the service, inferior in status and remuneration to the consultant grade and to offer a career up to retirement in all specialties. Immediately, one wonders what work there could be in hospital, suitable for a man over 40 with higher qualifications and long specialist experience which is not consultant work. Dr. Rowland Hill says none at all. The examples you suggest (presumably the best you could think of) should convince all that he is right.

It is widely known that much work which should be carried out by consultants is at present done by senior registrars and even registrars. Is it possible to believe that the work allotted to the proposed new grade would be anything less or that the men in the grade would be suitably occupied if it were? It could only be a grade of underpaid, dissatisfied, depressed consultants. The financial convenience to the Government of such a grade is obvious. Once introduced, nothing could withstand continual pressure from the Treasury to increase the proportion of subconsultants.

What then are the correct solutions? As always, close examination of the problem suggests the answer. At present, there are too many senior registrars in the major specialties in relation to the incidence of consultant vacancies (over 200 each in medicine and surgery compared with an average of 20–30 consultant retirements annually). On the other hand, many senior registrars and registrars are doing work which ought to be done by consultants. The correct long-term solution is to create new consultant sessions to cover this work, and discontinue some of the senior registrars' posts thus vacated. By these two processes, a proper ratio between the senior registrars and consultants could be established which would allow reasonable prospects of advancement after four years as senior registrar. It would also relieve the bottleneck between registrar and senior registrar, and make possible the attainment of a consultant post around 32 years, as envisaged by the Spens Committee.

Such an agreement could not be implemented overnight (though there is nothing to prevent the Ministry of Health accepting it in principle forthwith). In the meantime, the present generation of time-expired senior registrars are existing insecurely from year to year on an arrested salary, growing ever older and accepting ever more independent responsibility. Their needs as well as their contribution should be recognised by the granting forthwith of security of tenure and a rising incremental scale to those retained after four years. This would lift their burden of insecurity, and substantially relieve their financial hardship. Yet it in no way interferes with the final solution, or even commits either side as to its nature.

ROGER BREARLEY,
Chairman,
Liverpool. B.M.A. Hospital Junior Staffs Group.

SIR,—The interest taken in your leading article of Nov. 30 is further evidence of the urgent need for a satisfactory solution of the problem of hospital medical staffing. The S.H.M.O. Group of the B.M.A. is profoundly dissatisfied with the present position but is very suspicious of any attempt to create an alternative grade in view of the following grave errors and inherent injustices of the present position:

(1) The initial formation of a vague "subconsultant" grade.
(2) The expansion which has occurred in spite of the superficially fair document RHB 50/96.
(3) The small effect and unbalanced reviews of gradings.
(4) The Ministry's continued refusal to allow further reviews.
(5) Decreasing possibility of obtaining consultant status.
(6) Insidious threat of "clinical supervision" of fully trained staff.

For a new grade to be acceptable to S.H.M.O.s there would have to be adequate safeguards to prevent a repetition of such past mistakes.

All your correspondents have stressed the urgent need for an increase in the consultant establishment; and indeed if the needs of the country in this respect were adequately met the greater part of the problems of the senior registrars and S.H.M.O.s might well be solved.

The present plight of the senior registrars is desperate and that of the S.H.M.O.s is little if any better. This state is primarily due to the large amount of consultant work which is being done by these two grades. Unofficially this is both well known and is an accepted fact; the time is long overdue for official recognition and action.

Certain obstacles have to be overcome to provide a satisfactory solution. It is my personal view that ways to do this have evolved from the work of various committees and the efforts of many earnest people. The difficulties are as follows:

(1) No sudden increase should be made on the country's financial burden.
(2) Early selection for permanent consultant status.
(3) Adequate and satisfactory opportunities for those who for one reason or another are not so selected.

The first step should be to stop creating new senior registrars until the existing ones and S.H.M.O.s have been virtually absorbed by the formation of one consultant grade commencing at a salary scale lower than the present consultant minimum (relative), thus avoiding the financial strain of the necessary increase in the present consultant establishment.

The salary scale should rise by regular increments to a predetermined level, such as not less than 80% of the present consultant maximum (relative). Attainment of the highest level would depend on responsibility and individual worth. Such a solution would affect the present merit-award system in that ability and outstanding merit could be rewarded at all levels for permanent staff.

"Supervision" is the cause of much uncertainty and concern, especially as it has never been accurately defined. Fully trained staff on a permanent contract should only be appointed where theoretical knowledge is sound and sufficient experience has been obtained to realise when to take counsel with a senior colleague. The administrative division of duties by the senior consultant in a specialty is reasonable and would apply to all specialists in his area, but this would not be supervision of actual clinical work.

There should be worth-while alternatives for those registrars for whom there are no available openings when they have finished their trainee period. A loss of so much specialist skill would be personally bad and economically unsound.

Reorganisation of the public-health and school services could provide a number of attractive posts if liaison with

hospital work was developed; and group general practice, as has been so frequently suggested, should be enriched by recruiting from the registrar pool.

The present hierarchy who control negotiations on the future of hospital staffing all come from the top end of the consultant ladder and are therefore not acutely aware of the economic difficulties of their juniors. Adequate representation of all levels of hospital staff is therefore of paramount importance to obtain a satisfactory solution.

Leicester. G. WARING ROBINSON.

UNNECESSARY IRRADIATION IN CHEST RADIOGRAPHY

Mr. H. FISHER, technical manager of Sierex Ltd., writes:

"The article by Mr. Clarke [1] refers only to cones for limiting the radiography field. No mention is made of the numerous adjustable diaphragms which are on the market, particularly those fitted with a light device for projecting the X-ray field on to the patient. Our adjustable light diaphragm, which has come into widespread use in the past years, contains four sets of lead plates which are arranged so as to give optimum cut-off of the X-ray beam. The use of such a diaphragm, which also has an accurate light centring device, obviates the need for special precautions—e.g., protective screens—for the patient in order to shield the gonads or other vulnerable parts.

The cut-off which we can obtain with our diaphragm is equivalent to the cut-off obtained with a lead-rubber sheet as used during normal radiography with a divided cassette, so that the use of such a diaphragm would obviously give optimal radiographic results as well as affording maximum protection to both patient and operator."

Public Health

Statistical Review of England and Wales

IN part I of his Statistical Review for 1956,[2] the Registrar General records the detailed statistics of deaths from all causes and notifications of infectious diseases in that year, by age, sex, area of residence, and time of year.

Deaths.—The death-rate of 11.7 per 1000 living was the same as that in 1955. The death-rate in the age-group 0–4 was the lowest on record.

Stillbirths and infant deaths.—The stillbirth-rate remained steady at 23 per 1000 (the rate for every year but one since 1948). The infant-mortality rate fell from 25 per 1000 in the previous year to a new low level of 24 per 1000. The number of deaths from pink disease was 75 in 1947 and 1 in 1956.

Cancer.—The number of deaths from cancer was 92,710—an increase of 1370 compared with 1955. Deaths from lung cancer increased by 914, the total being 15,615 in men and 2571 in women. There were 2315 deaths from leukæmia in 1956, 2224 in 1955, and 1419 in 1946. 18% of all deaths were due to cancer.

Infectious diseases.—There were 5375 deaths from tuberculosis (6492 in 1955), 8 from diphtheria, 15 from scarlet fever, and 30 from measles—all low records. There were 114 deaths from acute poliomyelitis.

Cardiovascular disease.—Arteriosclerotic heart-disease caused 74,790 deaths in 1956, 70,597 in 1955, and 32,487 in 1946. Over 14% of deaths were due to this condition. 20,398 deaths were attributed to hypertensive disease, compared with 20,920 in 1955 and 16,757 in 1949.

Bronchitis.—19,852 men died from bronchitis, the highest figure since the war, except for 1951; the figure for women was 9818.

Violence.—21,870 (21,469) persons died by violence—5915 (5743) in home accidents, 5236 (5170) in road accidents, and 5282 (5000) by suicide (figures for 1955 in parentheses).

1. Clarke, W. G. *Lancet*, 1957, ii, 316.
2. Registrar General's Statistical Review of England and Wales, 1956. Part I. Tables, Medical. H.M. Stationery Office, 1957. Pp. 373. 15*s*.

Obituary

THOMAS PEEL DUNHILL

G.C.V.O., C.M.G., M.D. Melb., Hon. F.R.C.S., F.R.A.C.S.

Sir Thomas Dunhill, consulting surgeon to St. Bartholomew's Hospital and sergeant surgeon to King George VI, died on Dec. 22 at the age of 81. He was one of the group of distinguished medical immigrants from the Commonwealth who came to practise in this country after service in the first world war. His special contribution was to thyroid surgery, and even when the memory of his own technique and dexterity has faded his influence in fostering the study and investigation of the endocrine glands will persist.

Dunhill graduated M.B. with first-class honours from the University of Melbourne in 1904 and was already surgeon to St. Vincent's Hospital in Melbourne when war broke out in 1914. He served in France with the Royal Australian Army Medical Corps and before the end of the war he was appointed consulting surgeon to the British Expeditionary Force. For these services he was appointed C.M.G. in 1919. His war-time contacts with his British colleagues led to an invitation to join the surgical unit at St. Bartholomew's Hospital. Soon afterwards he was appointed a full surgeon to the hospital.

His first official appointment to the Royal Family was made in 1933 when he was appointed surgeon-in-ordinary to King George V, and in 1939 he became one of the sergeant surgeons to King George VI. He was head of the surgeons attached to the Royal Household at the time of the King's illnesses in 1949 and 1951. Dunhill was appointed C.V.O. in 1919, and promoted K.C.V.O. in 1933 and G.C.V.O. in 1949.

Within his own profession and specialty his work was recognised by his appointment to the Arris and Gale lectureship of the Royal College of Surgeons of England in 1931 and again in 1934, and to the Lettsomian lectureship of the Medical Society of London in 1937, and by the award of the society's Fothergill medal in 1941, and the Cecil Joll prize in 1948. He received an honorary M.D. from the University of Adelaide in 1935, and he was elected to the fellowship of the Australasian college of surgeons the same year and to the honorary fellowship of the English college in 1939. Of the work which had earned these honours J. P. R. writes:

Thomas Dunhill's name will live in history because he made outstanding contributions to the surgery of toxic goitre; but those of us who knew him well must recognise that this statement, though true, is but half, or even less than half the truth.

First, it is only part of the truth about the surgery of toxic goitre, for we cannot help thinking of thyroidectomy as it is performed today with all the safeguards provided by pre-operative medication and modern anæsthesia, and there is nothing in the statement to show that Dunhill shortly after becoming qualified realised that, contrary to current teaching, the illest patients were the ones who stood most in need of operation, and that he alone had the courage to tackle single-handed and successfully the problem of how to operate on these patients without killing them.

Nowadays we are familiar with the idea that safety in surgery is a matter of team work, but Dunhill's team consisted of only two people, the patient and himself. Recognising the dangers of contemporary anæsthetics he eliminated them by using local anæsthesia. For the rest he trusted to gentleness, to knowing when to stop and completing the operation in stages, and to establishing in his patients such confidence that they were prepared to plunge into the deep waters hand-in-hand with him, knowing that he would do his utmost literally to pull them through. This amazing story has unfortunately never been told, for Sir Thomas was too sensitive to publish it in his Joll lecture; and it is unlikely that it will ever be told now because Sister Mary Alban of St. Vincent's Hospital in Melbourne who helped him with his early operations is an old lady and may not be able to commit her memories to paper. It would take too long to go into details, but suffice it to say that Dunhill's pioneer work started in 1906; that he had established his reputation in this branch of surgery long before preoperative iodine became routine in 1923; and that he has been intimately associated with all the advances in the management of toxic goitre since that time.

Secondly, the statement is only part of the truth because by concentrating attention on his work on toxic goitre it tempts us to forget his painstaking studies of other aspects of thyroid disease, especially of carcinoma of the thyroid gland; and it is also unjust to him in failing to mention the excellence of his technique in other fields of surgery.

He was in the fullest sense of the term a general surgeon, at one time an able gynæcologist, interested and skilled in the treatment of fractures, familiar with the techniques of neurosurgery, and a brilliant exponent of operations such as radical mastectomy and block-dissection of the neck which demanded detailed anatomical knowledge. Latterly he confined himself to the surgery of the abdomen and the neck, and made important contributions to the literature on diaphragmatic hernia and pharyngeal diverticulum.

Dunhill was always anxious to learn by watching other masters of the craft at work. Returning home he would incorporate into his own system anything which he regarded as a technical improvement, and provided that the modification stood up to his critical appraisal, he would accept it as his standard procedure. He learned by example, and he taught by example. Formal lecturing he dreaded, and his publications, though models of clarity, cost him a stupendous amount of labour. Having given so much thought and attention to matters of detail, and having convinced himself that a certain method was the correct one, he was sometimes severe in his criticism of those who through thoughtlessness or ignorance did otherwise, and thus offended against some fundamental principle of surgery. To attempt to live up to his high standards has been a stimulus to many a young surgeon, and the generation trained by him will realise that their efforts to perpetuate what they learned from him must be the most worthy tribute to his memory.

F. R. F., describing Dunhill as " a man and a friend ", writes:

He was a big man in many ways. He was a skilful and eminent surgeon but that was incidental. It was as a man that he was unique, for he developed and used his capacities to the limits of his mental and physical endowment, and gave himself unsparingly to help his fellow men to a happier and a more complete life—not men as a race or a community, but each man, woman, or child with whom he came in contact and especially each who appealed to him for help. To all he was sympathetic, courteous, and gentle, with a kindly sense of humour.

His restless body with its quick movements seemed the natural partner for his mind—a mind ever hungry for new facts and new thoughts and ever probing for gaps in his own knowledge in order that he might try to fill them. In this endeavour he was tireless, talking on the telephone or writing, if that were more convenient, to any expert who might help him to see more clearly the problem of his patient and how he might help. There seemed to be no half measure for him when engaged on a problem, but he knew his physical limits and in later years while still busily engaged professionally, he would lie down for a few hours to gain strength for the next task. This output of energy, which seemed beyond that of other men, was given not only to his professional work but also to his trout and his salmon fishing, to shooting, to his appreciation of craftsmanship and art, to hospitality, and above all to his friendships. Nothing but the best was good enough for him, and he would arrange as efficiently for a day in the country as for a journey to Australia, for a dinner-party in his home as for a critical operation on a person of international importance. Worldly success came to him but he only welcomed it in order that he might more readily help others.

His example had an educative value impossible to measure, for while his skill in the execution of delicate operations gave him eminence as a surgeon, his study of his patients as persons, of their apprehensions, their worries, and their joys, and his understanding of their disturbed physiological functions were characteristic of the best physicians. His daily life was a lesson on how each can make the most of his talents in the service of mankind, and on how to see and seek the best in others.

JOHN JOYCE KEEVIL

D.S.O., M.A., M.D. Cantab., D.T.M. & H., F.S.A., F.R.Hist.Soc., J.P.

Commander Keevil, who died on Dec. 16 at the age of 56, had found time in a comparatively short life to win distinction as a naval medical officer and as a medical historian. In these last years he had drawn these two careers together, and the first two volumes of his medical history of the navy, the second only lately completed, will be a fitting memorial to a sailor and a scholar.

He was educated at Marlborough, Gonville and Caius College, Cambridge, and St. Thomas's Hospital. Soon after qualifying in 1925 he joined the Malayan Medical Service, but in 1927 he joined the Royal Navy as a surgeon, where he rose to the rank of surgeon commander in 1937.

At the beginning of the late war he was senior medical officer of H.M.S. *Illustrious*, the aircraft carrier. In January, 1941, the *Illustrious*, while helping to convoy troopships from Gibraltar to Greece, was attacked by a mixed Italian and German force of dive-bombers, high-level bombers, and torpedo-bombers. She was hit by 7000 lb. of bombs, and 125 officers and men were killed and a greater number injured. During the battle, amid blast, flame, and death, Keevil and his two junior medical officers rescued the wounded, rendered first-aid, and performed operations in a dark and flooded theatre.

Keevil's critical report on the medical aspect of the battle and his recommendations did much to help the Medical Department of the Admiralty in evolving the new medical organisation for action in H.M. Ships afloat. In particular, the site and construction of sickbays were reviewed. For his services Keevil received the D.S.O.

After a period of service on shore he was appointed the first naval editor of the *Official Medical History of the Second World War*. Here his judgment and experience were employed in planning the scope of the naval volumes of the *History* and in collecting material for them. Where possible, the framework which Keevil constructed has been followed in the two published volumes. A. S. M. writes:

Keevil proved a delightful colleague on the editorial committee of the *Medical History*. He could be outspoken and critical in his opinions, at times even cynical, but he gave

excellent counsel and untiring assistance, and his comments were often spiced with wit. He was of medium height, dark, and clean shaven. His manner, while always courteous, was somewhat reserved, but this only masked a kind and generous disposition. Though always ready to give of his wisdom to other students of medical history, he was modest and unassuming about his own attainments.

Keevil resigned the naval editorship to serve at sea again in the concluding years of the war, and retired from the Navy in 1946.

For the rest of his life Keevil was a medical historian. While serving at sea he had kept up his scholarship, and in 1948 he was appointed the first post-war keeper of the library of the Royal College of Physicians.

There he was faced with the literally burdensome task of handling and arranging thousands of books which had been in storage. His rearrangement of the library, under the direction of the Harveian librarian, was admirable and he did much research into the *Annals* and manuscripts of the college. This work was embodied in his readable biographies of the two Hameys—*Hamey The Stranger* (1952) and *The Stranger's Son* (1953).

His attainments were recognised by election to the Society of Antiquaries, and after he retired from the college he found congenial work as an inspector and adviser on private collections of manuscripts under the National Register of Archives. But his chief task and interest was of course his history of the naval medical service, and many will share his colleague W. R. L.'s regret that Keevil "has left his tale half told". Of this important project F. H. K. G. relates:

When I became scientific secretary of the Wellcome Trust in 1955, the trustees, on Prof. T. R. Elliott's recommendation, had already agreed to sponsor the preparation and publication of this work, and in my second year with the Trust I received from Keevil the typescript of volume I, covering the period 1200 to 1649. It was accompanied by a charming and modest letter in which he said that he would welcome any comments which I, as an experienced editor, would care to make upon it. I saw at once that it was a work of rare scholarship, and I soon found that the only suggestions I could make about it related to *trivia* and to points about which a reader less well-informed than the author might be glad of further explanation. All these suggestions were received by him with tolerance and gratitude (though many of the queries admittedly were born of my own ignorance), and we became firm friends.

At the time when volume I was published last summer, Keevil had already had the first severe attack of his illness. As soon as he was allowed to resume work he completed the writing of volume II, but in continuing the history he was handicapped by no longer being able to come up to London to work in the libraries, particularly that of the Royal Hospital at Greenwich, on which he depended so largely for source material for volume III. I was therefore glad that I was able to introduce to him Dr. Edwin Clarke, who could help him with the library research. Thanks to the author's indomitable spirit, and the support and help of his wife—herself a writer of distinction—the typescript of volume II was sent to press a few weeks ago, and on the day that Keevil died I received from him an optimistic letter indicating that volume III was beginning to take shape. That volume and the intended final volume must, it seems, be lost to us; but it is good to know that Keevil had the satisfaction of seeing uniformly enthusiastic press notices of his first volume, and that volume II, bringing the story of British naval medicine to the year 1714, will in due course appear as a further important contribution to British historical scholarship, and a lasting memorial to a remarkable man.

Commander Keevil married in 1946 Averil Salmond, daughter of Robert Mackenzie-Grieve of Torrington; and she survives him.

THOMAS RICHARD GODDARD

M.R.C.S.

Dr. Goddard, who died on Dec. 17, qualified from University College Hospital in 1925, and soon afterwards settled in practice at Hemel Hempstead. He remained there until he retired a few years ago to Berkhamsted. Of Dr. Goddard's eventful and unorthodox apprenticeship to medicine his old chief P. H. M.-B. writes:

When I was ordered up from Cairo in 1917 to organise a field laboratory in close contact with the large casualty-clearing station at Rafa behind the Gaza front, I found Sergeant Tom Goddard there as my main prop, and it was largely due to his knowledge of laboratory technique, skill, and efficiency that this vital laboratory service was in working order within 48 hours. From that time onwards until we were demobilised in 1919, we worked together. There was no lack of material, for we were really part and parcel of the adjoining hospital so that we were immersed in the diagnosis of dysentery, malaria, relapsing fever, typhoid, and many other disorders all day long and often far into the night. Not infrequently we handled 50 specimens of faeces a day and sometimes even more.

It was Goddard who helped to organise the malaria diagnosis stations without which Allenby might not have advanced to Aleppo in September, 1918, and on him I relied to help train our personnel in the intricacies of hæmatology and malaria diagnosis for this task. It was he who concocted the MacConkey's media upon which he cultivated the dysentery bacilli in those memorable days, and it was he who helped to isolate cholera vibrios on Dieudonné's medium, when an epidemic threatened the Army at a critical time early in 1918 and which was scotched by the detection and elimination of carriers "inside three weeks".

Goddard, too, was always interested in our private zoo, where we had cages containing desert rats, gerbils, and jerboas which wandered into our tent at night, and little owls, quail, corncrakes, larks, and various warblers which flew in in the daytime. Sometimes he was called upon to deal with camel convoys which arrived at the modest E.P.I.P. tent, which served as our main laboratory, laden with stools from suspects as far away as Beersheba.

In the rough-and-tumble of war pathology Goddard could always be relied on to be loyal, competent, and efficient, and the experience he gained served him in good stead when he decided to take up medicine directly after demobilisation. So keen and studious was he that he soon completed his medical course and settled down as a most capable and successful family doctor.

ARTHUR JAMES EWINS

D.Sc. Lond., F.R.S.

Dr. A. J. Ewins, director of research to May & Baker Ltd., who died on Dec. 24 at the age of 75, was associated with the late Sir Lionel Whitby in the joint investigation which led to the introduction of sulphapyridine. Though this drug has now been largely superseded by newer remedies, its workaday laboratory name (M. & B. 693) caught the public imagination and "M. & B" is still widely, if inaccurately, used for any sulpha derivative.

Ewins was the son of a railwayman in South London. He won a scholarship to Alleyn's School, Dulwich, and later worked as a technician at the Wellcome Laboratories, then at Herne Hill. With the help of evening classes he took his B.SC. Lond. in 1906 and joined the scientific staff of the laboratory. In 1914 he took the D.SC., and the same year he moved, with his chief Sir Henry Dale, to the Medical Research Committee which had been set up

on the outbreak of war. Part of Ewins' work was to arrange for the production of German drugs by British firms, and this association led in due course to his appointment as head of the chemical research department of May & Baker. He was responsible for the firm's research programme which in the '30s led to the development not only of sulphonamides but also of diamidine compounds which have proved efficacious in tropical medicine. Dr. Ewins was elected F.R.S. in 1943.

A memorial service for Dr. Maurice Mitman will be held at Joyce Green Hospital, Dartford, on Monday, Jan. 13, at 3 P.M. Tickets for the service can be had from the secretary, the Bow Arrow Hospital, Dartford.

Diary of the Week

JAN. 5 TO 11

Tuesday, 7th

UNIVERSITY OF LONDON
5.30 P.M. (London Hospital Medical College, E.1.) Dr. E. Jacobsen (Copenhagen): Pharmacological Classification of Central Nervous Depressants.
INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5.30 P.M. Mr. B. E. D. Cooke: Disorders of Buccal Mucosa.

Wednesday, 8th

POSTGRADUATE MEDICAL SCHOOL, Ducane Road, W.12
2 P.M. Dr. John Loutit: Successful Transplantation of Homologous and Heterologous Tissue in the Experimental Mouse.
INSTITUTE OF DISEASES OF THE CHEST, Brompton, S.W.3
5 P.M. Dr. Howard Nicholson: Chronic Pulmonary Suppuration.
INSTITUTE OF DERMATOLOGY
5.30 P.M. Dr. Arthur Tickner: Biochemistry of Hormones—Steroids.
NOTTINGHAM MEDICO-CHIRURGICAL SOCIETY, 64, St. James' Street, Nottingham
8.30 P.M. Dr. Roger Ormrod: Negligence.
MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH
8.30 P.M. (Royal College of Surgeons, 18, Nicolson Street, Edinburgh.) Dr. J. G. M. Hamilton, Prof. J. H. Gaddum, Prof. John Bruce: Medicine in Russia.

Thursday, 9th

ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East, S.W.1
5 P.M. Dr. Matthew Thomson: Some Aspects of Industrial Dermatitis (Watson Smith lecture).
LIVERPOOL MEDICAL INSTITUTION, 114, Mount Pleasant, Liverpool, 3
8 P.M. Lord Evans: Significant Hypertension.

Friday, 10th

POSTGRADUATE MEDICAL SCHOOL
10 A.M. Mr. J. C. Barratt: Multiple Primary Malignant Neoplasma.
INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330, Gray's Inn Road, W.C.1
3.30 P.M. Mr. Anthony Radcliffe: Hoarseness.

Appointments

CZYNIEWSKI, J. P., M.D. Lwow, D.A.: anæsthetist (S.H.M.O.), East Cumberland group of hospitals.
HAMSHAW, DORA, B.SC. Lond., M.R.C.S., D.C.H.: assistant M.O., York.
HARRISON, KENNETH, M.D. Manc., F.R.C.S., D.L.O.: part-time consultant E.N.T. surgeon, Stockport and Buxton group of hospitals.
JONES, BRENDA, M.B. Lpool, D.P.H.: assistant M.O.H. and school M.O., Southport.
SIMPSON, J. H., M.D. Cantab, M.R.C.P.: consultant physician with an interest in geriatrics, Exeter clinical area.

Newcastle Regional Hospital Board:
HARRIS, HILDA R., M.B. Manc., M.R.C.P.E., D.PATH.: assistant pathologist (S.H.M.O.), Hartlepools group of hospitals.
MCCLEMONT, JOHN, M.B. Edin., D.O.M.S.: consultant ophthalmologist, Darlington, Northallerton, and South West Durham groups of hospitals.
MITCHELL, J. C., M.D. Aberd.: consultant pathologist, Newcastle upon Tyne group of hospitals.

County Borough of West Hartlepool:
BISSET, JANET M., M.B. Edin., D.C.H.: assistant M.O.H. (maternity and child welfare).
MILLIGAN, H. C., M.B. Edin., D.P.H.: M.O.H.
TERRY, S. W. W., M.B. Madras, D.T.M. & H., D.P.H.: deputy M.O.H.

Births, Marriages, and Deaths

BIRTHS

KAY.—On Dec. 23, at the Cardiff Maternity Hospital, to Beverley (née Bryce) wife of Dr. Michael Doveton Kay, a son—Michael Graham Doveton.

DEATHS

HALL.—On Dec. 26, 1957, at 16, Pilgrims Lane, London, N.W.3, Edith May Hall, M.D., F.R.C.S., F.R.C.O.G.

Notes and News

CLEAN AIR

IN 1306 a citizen was tried and executed in London for burning "sea cole"; and though few of our modern reformers would favour so vigorous a remedy, the damage done by smoke to our health and economy has aroused the zeal and outcries of reformers since John Evelyn's *Fumifugium* of 1661, and even earlier. The Coal Smoke Abatement Society was founded in London in 1899, and in 1929 it fused with the provincial Smoke Abatement League of Great Britain to form The National Smoke Abatement Society. These societies have led the clean-air movement throughout the century, in the face of apathy, lack of financial support (for smoke abatement is not so romantic a cause as some less worthy), and even derision. They began the study of air pollution that is now made under Government auspices, they pioneered training-schemes for boiler-operators, and they conceived the idea of smokeless zones. Many of their views and policies were endorsed by the Beaver Committee, whose report led to the Clean Air Act.

On Jan. 1, the society changed its name to the National Society for Clean Air, in recognition of its widening scope, and became an incorporated body; it is a company limited by guarantee, without share capital, and with permission to omit the word "limited" from its title.

The Beaver Committee estimated that the most heavily polluted areas could be made smokeless in ten to fifteen years if smoke-control areas totalling 300,000 acres could be established yearly; but the total for 1957 was 489, and the total projected for 1958 less than 10,000 acres. Giving these figures, the society call attention to the need for continued and increasing instruction and publicity directed at authority and at the public; they encourage new members and donations to help in their important work, which includes the encouragement of research and of the application of new developments.

GERIATRIC UNIT AT DUNDEE

At a cost of £45,000, the geriatric unit at Maryfield Hospital, Dundee, has been reconstructed. It has been receiving patients since August, and it was visited by Princess Margaret on Dec. 6.

Accommodating 29 men and 30 women, on separate floors, it has for each sex four small wards and two sittingrooms. Confused and incontinent patients can be segregated from the mentally alert, and patients are promoted to the better wards as soon as their condition improves sufficiently.

The unit is complete in itself, with facilities for radiography, physiotherapy, and occupational therapy. Full use can be made in addition of the specialist services of the general hospital. The local health authority has plans well advanced for the provision of halfway-house accommodation both by the reconstruction of existing buildings and by new building.

The consultant physician in charge of the unit is Dr. O. Taylor Brown. The staff consists of a registrar, Dr. A. B. Grant, and two house-officers. The nursing staff, beside the two ward sisters, consists of staff nurses, student nurses, and nursing auxiliaries, with a proportion of male staff in the male ward. Dr. Taylor Brown is lecturer in geriatrics to the University of St. Andrews and regular ward teaching takes place in the unit.

The Medical Society for the Care of the Elderly holds its spring meeting in Dundee on March 28 and 29, when a visit to this attractive unit will be part of the programme.

HOSPITAL WORK ON TELEVISION

A series of programmes from regional hospitals is to be televised by the B.B.C. from Feb. 11. The first, dealing with poliomyelitis, will come from the Churchill Hospital, Oxford, and the second, on cancer, from the Christie Hospital and Holt Radium Institute in Manchester. The surgery of the circulation will be illustrated in three programmes—a mitral valvotomy at Queen Elizabeth Hospital, Birmingham, a porto-caval shunt from Bristol Royal Infirmary, and a third operation to be shown at Leeds Infirmary. The work of a cottage hospital

will be displayed at Stratton Hospital, Cornwall, and a programme on psychiatry from the Southern General Hospital, Glasgow, will include a filmed sequence showing Crichton Royal Mental Hospital, Dumfries. Wales will be represented by a programme on tuberculosis from Sully Hospital, Cardiff, and on pneumoconiosis from Llandough, Penarth. A brain operation is to be shown at the Royal Infirmary, Edinburgh.

The B.B.C. hopes that members of the medical profession will see these programmes and would be pleased to have comments on them from doctors.

CHRISTMAS QUIZ

Dr. J. B. Gurney Smith points out that the "original set of posers" provided by Dr. Ffrangcon Roberts in our issue of Dec. 21 assign Dr. Robert Bridges to the wrong hospital. He trained at St. Bartholomew's, not St. Thomas's, and some of his early verses appeared in *Round the Fountain*.

University of Cambridge

On Dec. 14 the degree of M.D. was conferred on the following:

P. S. Andrews, Edward Sharp, H. H. Stewart, S. E. Trickey.

University of London

Dr. E. G. L. Bywaters, senior lecturer at the Postgraduate Medical School of London, has been appointed to the new Empire Rheumatism Council chair of rheumatology at the school. We announced the endowment of the chair last week.

Dr. Bywaters, who graduated M.B. Lond. with honours from the Middlesex Hospital in 1933, was appointed in the following year to a Mackenzie-Mackinnon research scholarship of the Royal College to study rheumatoid arthritis. After visiting the United States with a Rockefeller fellowship he became clinical pathologist at the Bland-Sutton Institute of the Middlesex Hospital and later deputy director of the M.R.C. unit at the Royal Victoria Infirmary, Newcastle-upon-Tyne; and besides his lectureship at the school he also holds at present the directorship of the research unit at the Canadian Red Cross Memorial Hospital at Taplow. His published work includes papers on the metabolism of the joint spaces and during the late war he was one of the team which investigated the effect of crush injuries on renal function.

University of Leeds

At recent examinations the following were successful:

M.D.—R. E. Rossall.
Ch.M.—M. G. Wilson.
Ph.D.—J. A. Sharp.
M.B., Ch.B.—Geoffrey Hoyle (with second-class honours); T. L. Avery, Pamela M. W. Barker, J. E. Berry, Ian Bower, Barrie Breeze-Stringfellow, J. M. Brook, Charlotte N. Capes, R. B. Dobson, F. E. Eteng, Paul Foggitt, L. F. Gendall, T. M. Hall, Joyce M. Handby, D. A. W. Hopkinson, J. L. Horner, D. A. House, H. A. Hunt, R. C. Ingrey-Senn, P. J. Knapton, Margaret E. Lane, D. R. Liddle, M. D. McGrath, J. C. Nicholson, John Norman, Aleksandra M. Schwetz, Neville Seymour, J. M. Sinclair, P. Yuk Fen Taikie, Eifion Treharne, Marion E. Tyler, Sarah A. Williams.

University of Bristol

At recent examinations the following were successful:

M.B., Ch.B.—M. G. Addy, A. A. Codd, J. C. G. Cole, J. S. Edmondson, R. R. Gibbins, D. H. Howton, Osafo Lartey, J. G. Meadows, K. J. Roper, G. A. Russell, R. F. Weeks, R. C. Williams.

University of Liverpool

At a special congregation on May 7 to mark the opening of the new medical school by Queen Elizabeth the Queen Mother the honorary degree of LL.D. will be conferred on Lord Adrian, Sir David Campbell, and Sir Allen Daley.

University of Edinburgh

Mr. J. I. P. James has been appointed to the George Harrison Law chair of orthopædic surgery in succession to Sir Walter Mercer. He is expected to take up his appointment in the spring.

Mr. James, who is 44, qualified from University College Hospital, London, in 1938 and two years later took the F.R.C.S. In 1941 he became part-time registrar in the Royal National Orthopædic Hospital, London, and a year later surgical registrar at U.C.H. The same year he obtained the M.S. Lond. In 1943 he joined the R.A.M.C. and served with a special airborne force as a forward surgeon with guerilla forces in Yugoslavia, and as orthopædic surgeon to the forces in Greece. When he was demobilised he held the rank of lieut.-colonel and was officer commanding the surgical division of a general hospital. Since 1946 he has been orthopædic surgeon at the Royal National Orthopædic Hospital, and he is also assistant director of studies at the Institute of Orthopædics, London University, and civilian consultant orthopædic surgeon to the Royal Navy. In 1947–48 with a Rockefeller fellowship he worked in orthopædic centres at Boston, New York, and San Francisco. In 1956 he gave a Hunterian lecture on paralytic scoliosis and his other published work includes papers on the treatment of curvature of the spine and on reconstructive surgery of the hand.

Airborne Medical Society

A meeting of this society will be held on Friday, Jan. 31, at 5.30 p.m. at St. Mary's Hospital, London, W.2.

Institute of Dermatology, London

A semi permanent exhibition on the normal epidermis and some precancerous conditions by Dr. H. Haber, will be held from Jan. 1 to 17 at the institute, Lisle Street, W.C.2.

The Prime Minister and the Whitley Award

On Dec. 23 Mr. Harold Macmillan received a deputation led by Mr. Ben Smith, chairman of the staff side of the General Council of Whitley Councils, and explained that under present economic conditions it was not possible to lift the Ministerial veto on a 3% increase for administrative and clerical staff in the National Health Service.

British Journal of Tuberculosis

The editor of this journal, Dr. Philip Ellman, is to have an assistant editor, and Mr. J. R. Belcher has been appointed. Prof. Charles Cameron, Dr. Maurice Davidson, and Dr. Reginald Ellis are retiring from the editorial board and Dr. Frank Scadding, Dr. I. W. Grant, and Dr. R. Y. Keers have been appointed in their place. Prof. O. L. Wade is to be an additional representative on the board.

Spastics in the West of Scotland

A year ago a new residential school, Scotscraig, was opened in Paisley under the direction of the Scottish Council for the Care of Spastics. The Council's first school, Westerlea, was started in Edinburgh in 1947. When extensions planned for the Paisley school have been completed, it should have enough places to educate and treat suitable children from the West of Scotland.

At present it has 8 resident pupils and 4 day pupils; 17 other children, who go to school elsewhere or are below school age, attend for physiotherapy or speech therapy. Future plans include an extension of outpatient treatment by a team of therapists visiting outlying centres and a nursery school for preschool children. Children are selected by a screening panel consisting of an orthopædic surgeon, a pædiatrician, a child psychiatrist, and an educational psychologist. Arrangements for screening are made with the social worker, Scotscraig, Park Road, Paisley.

Medical Research Council

The Council invite applications for the following fellowships for 1958–59:

Fellowships in Clinical Research.—The Council are offering a further series of fellowships in clinical research, tenable at centres in the United Kingdom. These fellowships are open to suitably qualified medical graduates who wish to prepare for a career in clinical research.

Rockefeller Travelling Fellowships.—These fellowships are intended for graduates resident in this country who have had some training in research work in clinical medicine or surgery, or in some other branch of medical science, and who are likely to profit by a period of work at a centre in the United States or elsewhere abroad, before taking up appointments for higher teaching or research in the United Kingdom.

Dorothy Temple Cross Fellowships in Tuberculosis.—These fellowships offer special opportunities for study or research to British doctors who intend "to devote themselves to the advancement by teaching or research of curative or preventive treatment of tuberculosis." The fellowships will, as a rule, be awarded to candidates who wish to make their studies or inquiries elsewhere than in the United Kingdom.

Alexander Pigott Wernher Fellowships in Ophthalmology and Otology.—These fellowships are intended for doctors who are likely to profit by a period of work in ophthalmology or otology at a centre abroad before taking up positions for higher teaching and research in these branches of medical science. The awards will normally be tenable for one year.

United States Public Health Service Research Fellowships.—A limited number of these fellowships are being offered to highly qualified scientists from outside the United States to work in the medical and biological laboratories of the United States. British doctors should apply in the first instance to the Medical Research Council.

French Government Exchange Scholarships.—Under the terms of a reciprocal arrangement with the Centre National de la Recherche Scientifique, two scholarships tenable at research institutions in France are offered to British workers in medical science. The scholarships will normally carry a maintenance allowance of 50,000–70,000 francs a month.

All the fellowships provide for the payment of a maintenance allowance at the rate of £650 per annum for a single fellow or £900 per annum for a married fellow ($3000 and $4200 respectively if the fellowship is held in the United States). Allowances are made for travelling and other approved expenses. Forms of application for these fellowships may be had from the secretary of the Council, 38, Old Queen Street, London, S.W.1, with whom applications must be lodged by March 1 (March 31 for the Pigott Wernher fellowships and the French scholarships).

Mr. A. L. d'Abreu is visiting Peru from Jan. 5 to Feb. 6 under the sponsorship of the British Council. He will give twelve lectures on thoracic surgery at the tuberculosis hospital at Lima.

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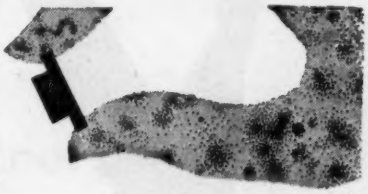

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* Standing on one's head is reputed to be a good cure for migraine[1]—but not every patient is so agile.

[1] *Brit. med. J.* (1957) 2, 633

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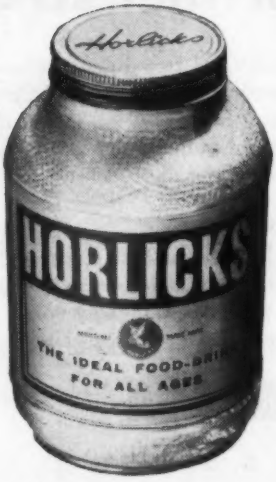

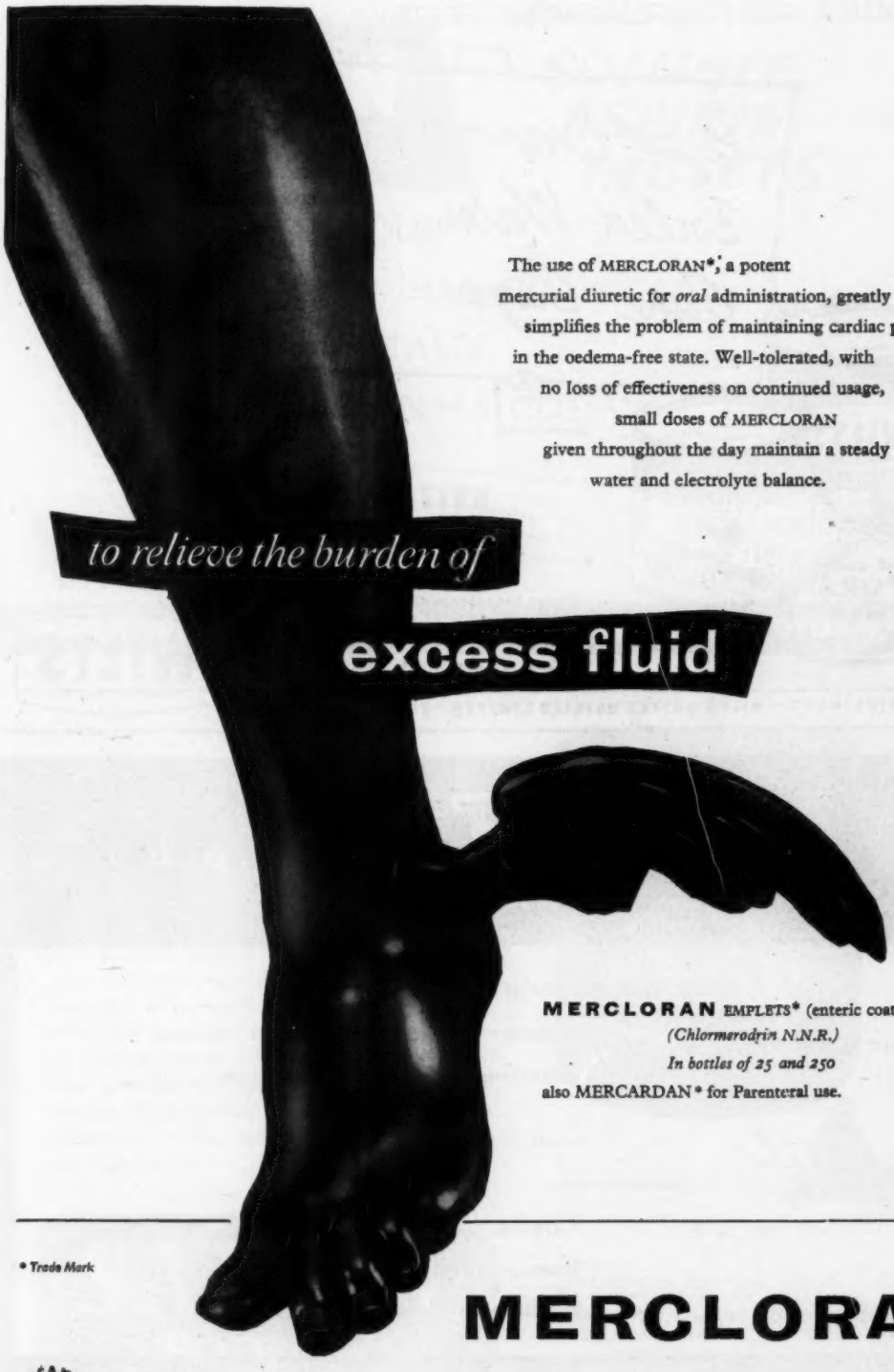

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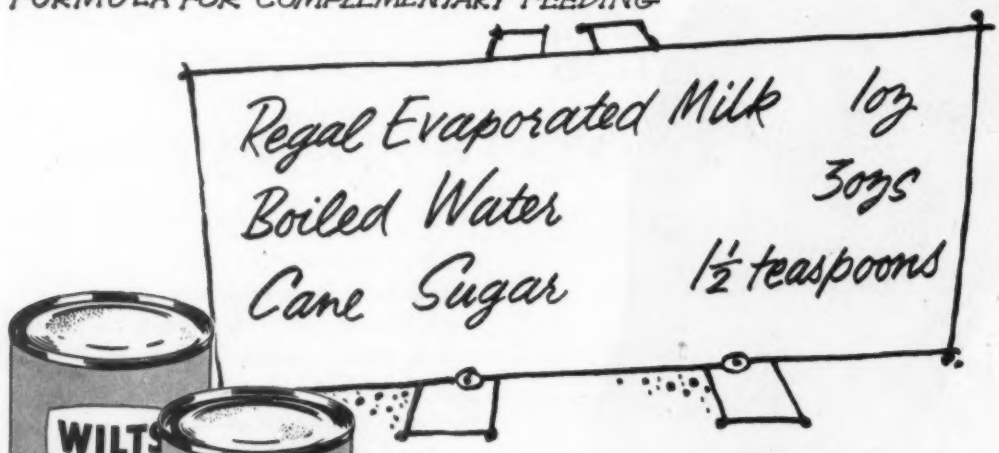

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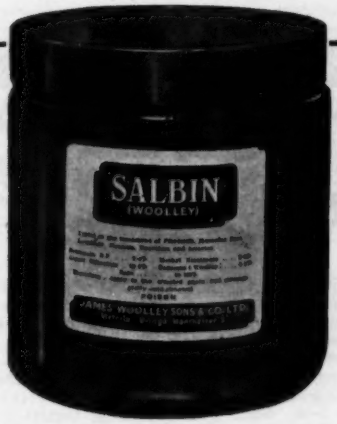

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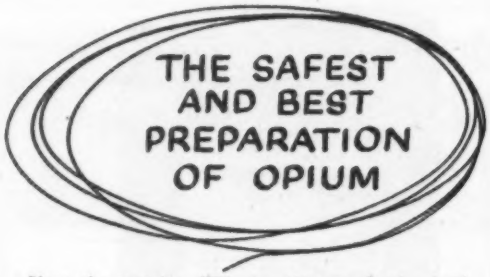

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Academic and Educational

ROYAL COLLEGE OF PHYSICIANS OF LONDON

MATTHEW SYDNEY THOMSON, Esq., M.D., F.R.C.P., will deliver the Watson Smith Lecture on THURSDAY, 9TH JANUARY, 1958, at 5 P.M. at the College, Pall Mall East, S.W.1.

Subject: "Some Aspects of Industrial Dermatitis."

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AUBREY GERALD LEATHAM, M.B., B.Ch., F.R.C.P., will deliver the Goulstonian Lectures on TUESDAY, 14TH and THURSDAY, 16TH JANUARY, 1958, at 5 P.M. at the College.

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UNIVERSITY OF LONDON

"THE SCIENTIFIC BASIS OF MEDICINE"
1957–1958

SECOND TERM: JANUARY–FEBRUARY, 1958

The following lectures, which are designed especially for research workers and specialists in training, will be delivered at The London School of Hygiene and Tropical Medicine, Keppel-street, W.C.1, on TUESDAY and THURSDAY afternoons at 5.30 P.M. during the second term of the session 1957–58. Admission free without ticket.

Date	*Lecturer*	*Title*
January		
Thurs. 9th	Prof. L. S. PENROSE, M.A., M.D., F.R.S. (Galton Professor of Eugenics, University College, London).	Biochemical Genetics and Medicine.
Tues. 14th	Dr. L. E. GLYNN, B.SC., M.D., M.R.C.P. (Director of Pathology, Canadian Red Cross Memorial Hospital, Taplow).	The Structure and Stability of Collagen in Relation to Diseases of Connective Tissue.
Thurs. 16th	Prof. G. PAYLING WRIGHT, D.M., F.R.C.P. (Sir William Dunn Professor of Pathology, Guy's Hospital Medical School).	Cell Regeneration and Pathological Processes.
Tues. 21st	Dr. L. H. GRAY, M.A., PH.D. (Director, B.E.C.C. Research Unit in Radiobiology, Mount Vernon Hospital).	The Influence of Oxygen on the Response of Cells and Tissues to Ionising Radiation.
Thurs. 23rd	Mr. A. F. HUXLEY, M.A., F.R.S. (Assistant Director of Research in Physiology, University of Cambridge).	Excitation and Contraction in Voluntary Muscle.
Tues. 28th	Dr. J. A. FRASER ROBERTS, M.D., D.SC., F.R.C.P. (M.R.C. Clinical Genetics Research Unit, Institute of Child Health).	Blood-Group Genetics.
Thurs. 30th	Miss EDITH BULBRING, M.A., M.D. (Lecturer, Department of Pharmacology, University of Oxford).	Physiology and Pharmacology of Intestinal Smooth Muscle.
February		
Tues. 4th	Dr. M. G. P. STOKER, M.D. (Huddersfield Lecturer, Department of Pathology, University of Cambridge).	Growth of Viruses.
Thurs. 6th	Dr. C. S. HALLPIKE, M.B., B.S., F.R.C.P., F.R.C.S., F.R.S. (Director, M.R.C. Otological Research Unit, National Hospital, Queen Square).	Remarks upon the Scientific Basis of Otological Practice.
Tues. 11th	Prof. J. M. YOFFEY, D.SC., M.D., F.R.C.S. (Professor of Anatomy, University of Bristol).	Some Problems of Lymphoid Tissue.
Thurs. 13th	Prof. A. NEUBERGER, M.D., PH.D., F.R.S. (Professor of Chemical Pathology, St. Mary's Hospital Medical School).	Enzymes in Health and Disease.
Tues. 18th	Dr. PAUL FOURMAN, M.D., M.R.C.P. (Senior Lecturer in Medicine, Welsh National School of Medicine).	Potassium Depletion.
Thurs. 20th	Prof. P. L. KROHN, B.A., B.M., B.CH. (Nuffield Senior Gerontological Research Fellow and Hon. Professor, University of Birmingham).	Processes of Ageing in the Reproductive System.
Tues. 25th	Prof. C. H. STUART-HARRIS, M.D., F.R.C.P. (Sir George Franklin Professor of Medicine, University of Sheffield).	Adenoviruses and Respiratory Disease in Man.
Thurs. 27th	Prof. G. W. A. DICK, D.SC., M.D., F.R.C.P.E. (Professor of Microbiology, The Queen's University of Belfast).	Poliomyelitis.

UNIVERSITY OF OXFORD

RADCLIFFE TRAVELLING FELLOWSHIP, 1958

AN EXAMINATION for a Fellowship of the annual value of £600, tenable for 2 years, will be held at Oxford on 15TH FEBRUARY, 1958. Candidates must have passed all the examinations for the Degree of Bachelor of Arts and Bachelor of Medicine, and must not have exceeded 4 years (exclusive of national service) from the time of passing the last examination for the Degree of Bachelor of Medicine.

The examination will take the form of a self-chosen essay and an interview. Further particulars to be obtained from the Regius Professor of Medicine, 13, Norham-gardens, Oxford.

All applications, with essays, must be sent to the Regius Professor of Medicine, 13, Norham-gardens, Oxford, by 31st January, 1958.

THE LONDON HOSPITAL MEDICAL COLLEGE

COURSE IN ADVANCED SURGERY

AN EVENING POSTGRADUATE COURSE IN SURGERY for the Final Examination of the F.R.C.S. will be held at The London Hospital from MONDAY, 10TH MARCH, to MONDAY, 28TH APRIL.

The Course will be held on Monday and Wednesday evenings from 6.30 P.M. to 8.30 P.M. with the exception of Monday, 7th April, and will be limited to 18 students.

The fee for the Course will be £12. An entrance fee of £5 5s. must be paid by non-London Hospital graduates.

Applications should be made to The Dean, H. B. MAY, M.D., F.R.C.P., The London Hospital Medical College, Turner-street, E.1.

UNIVERSITY OF LONDON

A LECTURE entitled "The Pharmacological Classification of Central Nervous Depressants" will be delivered by Dr. E. JACOBSEN (Danish Medicinal & Chemical Co., Ltd., Copenhagen) at 5.30 P.M. on 7TH JANUARY at the London Hospital Medical College (Bearstead Lecture Theatre), Turner-street, E.1.

Admission free, without ticket.

JAMES HENDERSON, Academic Registrar.

INSTITUTE OF ORTHOPÆDICS

PROVISIONAL PROGRAMME

A COURSE OF LECTURES on "Disorders of the Spine" will be given in the Lecture Room at the Institute of Orthopædics, Royal National Orthopædic Hospital, 234, Great Portland-street, London, W.1, on FRIDAYS at 6 P.M. on the following dates :—

17th Jan.	Scoliosis I	Mr. J. I. P. JAMES
31st Jan.	Scoliosis II	Mr. J. I. P. JAMES
7th Feb.	Spondylolisthesis	Mr. P. H. NEWMAN
14th Feb.	Ankylosing Spondylitis	Mr. D. TREVOR
21st Feb.	Infections of the Spine other than Tuberculosis	Mr. C. W. MANNING
28th Feb.	Disc Lesions	Mr. P. H. NEWMAN
7th March	Osteoporosis of the Spine	Dr. R. NASSIM
14th March	Tumours of the Spine	Mr. H. J. BURROWS
21st March	Pott's Disease	Mr. J. A. CHOLMELEY
28th March	Pott's Paraplegia	Mr. H. J. SEDDON

The fee for the full course will be 3 guineas, or for a single lecture 7s. 6d.

Tickets may be obtained on application to the Dean, at 234, Great Portland-street.

POSTGRADUATE LECTURES AT ST. MARK'S HOSPITAL

(in association with the British Postgraduate Medical Federation)

During MARCH, 1958, a series of 5 LECTURE-DEMONSTRATIONS will be given at St. Mark's Hospital on Saturday mornings from 9.30 to 12. These are intended as a revision course in surgical diseases of the rectum and colon for postgraduate students working for the F.R.C.S.

Date 1958	*Subjects*
1st March	The Anatomy and Physiology of the Rectum and Colon, Hæmorrhoids, Fissure and Fistula.
8th "	Cancer of the Rectum and Anus.
15th "	Cancer of the Colon: Polyps and Polyposis.
22nd "	Ulcerative Colitis.
29th "	Diverticulitis: Rectal Prolapse.

At least 2 of the members of the staff of St. Mark's Hospital will be present on each occasion to take part in the teaching.

Not more than 20 students will be accepted.

The fee for the whole 5-week course will be 5 guineas.

Application for admission should be made to the Dean, Dr. CUTHBERT DUKES, at St. Mark's Hospital, City-road, London, E.C.1.

LONDON SCHOOL OF MEDICINE AND TROPICAL MEDICINE

POSTGRADUATE ACADEMIC DIPLOMA IN BACTERIOLOGY

The COURSE for the Postgraduate Diploma in Bacteriology for the session 1958–59 will commence in October, 1958. This is a full-time day course extending over 1 academic year. Fee for the course £73 10s.

The course may be taken by :

(*a*) Graduates in medicine or veterinary science desiring to study bacteriology as applied to medicine and hygiene ;

(*b*) Graduates in science with a first- or second-class honours degree in chemistry, or its equivalent. For such students, the course covers the fields of general bacteriology, chemical microbiology and industrial microbiology.

Applications for admission to the Diploma course must be received not later than 1st March, 1958.

Further information and application forms can be obtained from the Registrar, London School of Hygiene and Tropical Medicine, Keppel-street, W.C.1.

THE NUFFIELD FOUNDATION

NUFFIELD INSTITUTE FOR MEDICAL RESEARCH

RESEARCH FELLOWSHIPS

The Nuffield Foundation, as an experiment, is prepared to offer 1 Research Fellowship annually in each of the 3 years 1958, 1959, and 1960, tenable at the Nuffield Institute for Medical Research at Oxford, to enable a suitably qualified person who intends to follow an academic career in obstetrics or pædiatrics in the United Kingdom to concentrate for a year on animal experiments directly related to basic physiology or pharmacology in the fœtus or the newborn.

Each fellowship will be tenable for 1 year and is limited to graduate of medicine of a University within the British Commonwealth. Normally a candidate should have completed an appointment as Registrar (or its equivalent) in an approved department of obstetrics or pædiatrics, and also have obtained the higher qualification appropriate to his chosen specialty. The stipend will be within the approved range of salaries for Senior Registrars under the National Health Service.

Applications for the award beginning in 1958 must be received before 15th February, 1958, by the Director, The Nuffield Foundation, Nuffield Lodge, Regent's Park, N.W.1, from whom full particulars and application forms can be obtained.

L. FARRER-BROWN, Director of the Nuffield Foundation.

IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY

A COURSE of 8 LECTURES on "Microscopy" will be given by B. K. JOHNSON on TUESDAYS and THURSDAYS at 4 P.M. commencing TUESDAY, 28TH JANUARY, 1958.

This will be followed by a course of Practical Instruction, commencing 24th February, 1958, until 21st March.

Application for admission to either, or both of these courses should be made to the Registrar, Imperial College, Prince Consort-road, London, S.W.7.

UNIVERSITY OF TORONTO

FELLOWSHIPS IN MEDICAL RESEARCH AND IN PREVENTIVE MEDICINE

The Col. Sir Albert Gooderham Memorial Fellowship in the Connaught Medical Research Laboratories, University of Toronto.

The Fitzgerald Memorial Fellowship in the School of Hygiene, University of Toronto.

Available to graduates in Medicine or Science—stipends up to $5000 p.a.

For information write to the Director, Connaught Medical Research Laboratories, or the Director, School of Hygiene, University of Toronto.

THE ROYAL MARSDEN HOSPITAL AND INSTITUTE OF UROLOGY. Applications are invited for a full-time RESEARCH FELLOWSHIP with the status and pay equal to Senior Registrar in the Radiological Departments of the above Institutions. Candidates should hold a diploma in radio-diagnosis and should be prepared to carry out research work in urology and in the diagnosis of malignant diseases. Exceptional facilities are available including image intensification and cineradiography.

Applications should be sent to the House Governor, Royal Marsden Hospital, S.W.3. The Departments may be visited by direct appointment.

UNIVERSITY OF ABERDEEN. Applications are invited for the following:

LECTURESHIP IN BACTERIOLOGY. Candidates should preferably have experience of virus work. Salary for medical graduate on scale rising to £1900 or for science graduate rising to £1650.

GEORGINA McROBERT FELLOWSHIP. For the investigation of the cause, prevention and treatment of cancer. Salary on scale £800–£50–£1100.

Both posts are open to men or women holding medical or science degrees and carry F.S.S.U. and child allowance.

Particulars from the Secretary, The University, Aberdeen, with whom applications should be lodged by 14th February, 1958:

For the Lectureship—(8 copies)
For the Fellowship—(14 copies)

UNIVERSITY OF BRISTOL. Applications are invited for an appointment as DEMONSTRATOR IN PATHOLOGY. Salary scale £900–£50–£1100 p.a. according to qualifications and experience. Previous experience in pathology is not necessary. The duties include assistance with the teaching of medical and dental students and general pathology for veterinary students, and the conduct of autopsies. Facilities for research and experience of diagnostic histology are available.

Applications, giving full name, age, qualifications, and details of education and experience, together with the names of not more than 3 referees, should reach the undersigned, from whom further particulars may be obtained, on or before 11th January, 1958. H. C. BUTTERFIELD, Registrar and Secretary.

UNIVERSITY OF DURHAM (Medical School, King's COLLEGE, NEWCASTLE UPON TYNE) AND UNITED NEWCASTLE UPON TYNE HOSPITALS. The University of Durham and the Board of Governors of the United Newcastle upon Tyne Hospitals together, intend to make a combined whole-time appointment of PROFESSOR OF DERMATOLOGY AND CONSULTANT DERMATOLOGIST, with the special object of fostering research and clinical development in dermatology. During the first five years the holder of the dual appointment will be remunerated as a Consultant by the Board of Governors and his appointment with the University will be honorary. At the end of this period he will be paid as a Professor by the Council of King's College, Newcastle upon Tyne, on behalf of the University and will hold an honorary appointment as Consultant with the Board of Governors.

Applications are invited for the dual appointment, further particulars of which may be obtained from the undersigned with whom 16 copies of application should be lodged not later than 1st May, 1958. Candidates outside the British Isles may submit 1 copy only. E. M. BETTENSON, Registrar.

University Office, 46, North Bailey, Durham.

ST. MARY'S HOSPITAL MEDICAL SCHOOL. Applications are invited for the appointment of ASSISTANT LECTURER IN MORBID ANATOMY for a period of 3 years from 1st February, 1958, or as soon as possible thereafter. Salary scale £900–£100–£1100, together with superannuation and children's allowance. Considerable time available for experimental work.

Application (2 copies), with the names of 2 referees, should be sent by 15th January, 1958, to the Secretary, St. Mary's Hospital Medical School, from whom further particulars may be obtained.

UNIVERSITY OF LONDON. The Senate invite applications for the CHAIR OF PÆDIATRIC SURGERY tenable at the Institute of Child Health (salary within the range £2500–£3000 a year).

Applications (10 copies) must be received not later than 1st March, 1958, by the Academic Registrar, University of London, Senate House, W.C.1, from whom further particulars may be obtained.

UNIVERSITY COLLEGE, Ibadan, Nigeria. Faculty of Medicine. Applications are invited for SENIOR LECTURESHIP AND LECTURESHIP IN RADIOLOGY. Appointments, to commence as soon as possible, for 3 years in first instance. Successful candidates will be offered honorary consultant appointments by Board of Management of University College Hospital.

Salary scales (clinical):
Senior Lecturer: £1850–£100–£2450 p.a.
Lecturer: £1700–£100–£2100 p.a.

Allowance for up to 3 children, £50 p.a. per child resident in Nigeria, £100 p.a. per child resident elsewhere. Part furnished accommodation at rent not exceeding 7.7 % of salary. Passages for member of staff, wife and up to 3 children under 11 years, on appointment, overseas leave and termination. F.S.S.U. Outfit allowance £60.

Detailed applications (10 copies), naming 3 referees, by 3rd February, 1958 to Secretary, Senate Committee on Colleges Overseas in Special Relation, University of London, Senate House, London, W.C.1, from whom further particulars may be obtained.

UNIVERSITY OF MELBOURNE. Medical Professorial UNIT, ST. VINCENT'S HOSPITAL. Applications are invited for the posts of FIRST ASSISTANT and SECOND ASSISTANT in the above unit. The appointments will be full-time and will involve the care of patients, teaching and research.

Salaries, depending on experience:
First Assistant—£A2500–£A3000 p.a.
Second Assistant—£A2000–£A2500 p.a.
Superannuation is similar to F.S.S.U.

The appointments will be for 3 years in the first instance and will be renewable. The positions are now vacant, but suitable starting dates will be arranged with the successful applicants. Applicants must hold a postgraduate degree or Diploma in Medicine. Applicants for the position of First Assistant should state whether they wish to be considered for the post of Second Assistant if not successful in their original application.

Further particulars may be obtained from the Secretary, Association of Universities of the British Commonwealth, 36, Gordon-square, London, W.C.1. Applications close in Australia and London on 15th February, 1958.

Hospital Services: Senior Appointments

GUY'S HOSPITAL. The Board of Governors invites applications for the appointment of an ASSISTANT SURGEON in the Genito-Urinary Department to fill a vacancy which will occur in July, 1958. The appointment is of consultant status and 4 attendances will be required per week. The conditions of service will be in accordance with the terms and conditions of service of hospital medical staff.

Applications (1 copy), together with the names of 3 referees, should be lodged with the Superintendent, Guy's Hospital, London Bridge, S.E.1, not later than 20th January, 1958. In accordance with Statutory Instrument No. 1259 of the National Health Service regulations, canvassing members of the Board or Advisory Appointments Committee will lead to disqualification.

HOSPITAL OF ST. JOHN AND ST. ELIZABETH, N.W.8. Applications are invited for the post of HONORARY ASSISTANT OBSTETRICIAN AND GYNÆCOLOGIST to the above Hospital. Wide experience and higher qualifications are essential.

Applications (30 copies) should be sent to the undersigned on or before Monday, 10th February, 1958. Testimonials are not required but the names of 3 persons willing to act as referees should be furnished. Sister MARY CLARE, Secretary,

Hospital of St. John and St. Elizabeth.

60, Grove End-road, London, N.W.8.

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD.

1. CONSULTANT RADIOLOGIST (diagnostic) 3 half-days a week, Thursday, Friday and Saturday mornings, Willesden General Hospital, Hariesden-road, N.W.10 (127 Beds).

Applications before 3rd February, 1958.

2. ASSISTANT PATHOLOGIST (Senior Hospital Medical Officer grade), 4 half-days a week, Clare Hall Hospital, South Mimms, near Barnet (405 Beds for tuberculous and non-tuberculous chest diseases, including a thoracic surgical unit).

Applications before 5th February, 1958.

3. ASSISTANT PSYCHIATRIST, whole-time, Senior Hospital Medical Officer grade, Hill End Hospital, St. Albans (760 Beds). Encouragement given to research. Accommodation available for single candidate.

Applications before 11th February, 1958.

Hospitals may be visited by direct appointment.

Application forms obtainable from and returnable to Secretary, North West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Part-time CONSULTANT OPHTHALMIC SURGEON to undertake 6 notional half-days a week in the Mid Kent and Medway and Gravesend Groups of hospitals. The successful candidate will be required to reside in the Mid Kent area, where the main duties (5 notional half-days) will be undertaken. Extensive experience in the specialty, including major ophthalmic surgery, is essential and the possession of a higher qualification is desirable. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staff (England and Wales). Candidates may visit the hospitals concerned.

Apply, stating nationality, age, sex, qualifications and experience, including details of present appointment and of war service, together with the names and addresses of 3 referees, to: The Secretary, Advisory Appointments Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 18th January, 1958.

BIRMINGHAM REGIONAL HOSPITAL BOARD. Applications are invited from duly qualified medical practitioners for the whole-time post of DEPUTY SENIOR ADMINISTRATIVE MEDICAL OFFICER at a salary of £1900–£100(5)–£2400 p.a. subject to National Health Service (superannuation) regulations. Experience in hospital administration essential; D.P.H. an advantage. Duties: to assist the Senior Administrative Medical Officer in the planning, organisation and staffing of the hospital and specialist services of the region and such administrative and executive functions as may be assigned to him.

Applications (15 copies), stating qualifications and experience, together with the names of 3 referees, should be addressed to the Secretary of the Board (from whom further particulars of the post may be obtained) at 10, Augustus-road, Edgbaston, Birmingham, 15, by 25th January, 1958. Canvassing will disqualify.

BIRMINGHAM REGIONAL HOSPITAL BOARD. Whole-time ASSISTANT PSYCHIATRIST, St. George's Hospital, Stafford. Salary £1653–£2126 p.a. Experience specialty with D.P.M. required. Resident—house available.

Applications (15 copies), stating, name, age, nationality, qualifications, present and previous appointments and details of 3 referees, to Secretary, 10, Augustus-road, Birmingham 15, by 3rd February, 1958.

LEEDS REGIONAL HOSPITAL BOARD. Applications are invited from medical practitioners for the appointment of REGIONAL PSYCHIATRIST (salary scale £2300–£115(5)–£2875). The person appointed will be engaged wholly on administrative duties on the staff of the Senior Administrative Medical Officer and will be concerned primarily with the Mental Health Services in the Region. Candidates should hold a higher medical qualification and preferably the D.P.M. They should have wide experience in general psychiatry, mental hospital administration and/or community health.

Applications (12 copies), with full details of qualifications and experience, together with the names and addresses of 3 referees, to the Secretary, Park Parade, Harrogate, by 31st January, 1958.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. Applications are invited for appointment of CONSULTANT PÆDIATRICIAN of junior status for duty initially at the Royal Liverpool Children's Hospital. The appointment is for 3 notional half-days a week and the duties are mainly in cardiology. Candidates must possess a registrable qualification and F.R.C.P. or M.R.C.P. (London, Edinburgh or Ireland).

Detailed applications, giving full particulars of age, qualifications, &c., present and previous appointments, and the names of 3 referees, should reach the Secretary, 80, Rodney-street, Liverpool, 1, by 25th January, 1958.

LIVERPOOL REGIONAL HOSPITAL BOARD. SOUTHPORT PROMENADE HOSPITAL. Applications are invited for the post of part-time CONSULTANT E.N.T. SURGEON giving 2 notional half-days per week at the above Hospital from 1st April, 1958. Applicants should possess a higher qualification in surgery and have wide experience in E.N.T. surgery.

Forms of application from Dr. T. Lloyd Hughes, Senior Administrative Medical Officer, Liverpool Regional Hospital Board, 19, James-street, Liverpool, 2, to be returned not later than 25th January, 1958.

VINCENT COLLINGE, Secretary to the Board.

LIVERPOOL REGIONAL HOSPITAL BOARD. RAINHILL HOSPITAL. Applications are invited for the post of Whole-time ASSISTANT PSYCHIATRIST (Senior Hospital Medical Officer) with duties at the above Hospital including attendance at out-patient clinics outside the hospital. The applicants should possess the D.P.M. and have reasonable experience in psychiatry including practical knowledge of outpatient work. The post is tenable from 1st April, 1958.

Forms of application from Dr. T. Lloyd Hughes, Senior Administrative Medical Officer, Liverpool Regional Hospital Board, 19, James-street, Liverpool, 2, to be returned not later than 25th January, 1958.

VINCENT COLLINGE, Secretary to the Board.

NEWCASTLE REGIONAL HOSPITAL BOARD. Locum OPHTHALMOLOGIST (Senior Hospital Medical Officer status) for Sunderland and Hartlepools Groups of hospitals.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, immediately.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time CONSULTANT PATHOLOGIST required for the Boston Group of hospitals.

Application forms and further details from the Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 3rd February, 1958.

VANCOUVER, CANADA. BRITISH COLUMBIA CANCER INSTITUTE. 2 RADIOTHERAPISTS required. Salary range, $10,000–$16,000 p.a. depending on experience.

Applicants may write or interview Dr. A. M. EVANS at the Dorchester Hotel, Park-lane, London, from 8th January to 25th January, 1958.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of Whole-time ASSISTANT E.N.T. SURGEON at Stobhill General Hospital, Glasgow. Salary (at age 32 and over) on the scale £1653 15s.–£52 10s.–£2126 5s.

Applications (16 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, not later than 30 days after the publication of this advertisement.

Hospital Services: Junior Appointments

BETHNAL GREEN HOSPITAL, Cambridge Heath-road, E.2. HOUSE SURGEON (gynæcology and obstetrics), pre-registration post, vacancy 24th January, 1958.

Applications, stating experience and copies of 2 testimonials, to Hospital Secretary.

BETHNAL GREEN HOSPITAL, Cambridge Heath-road, E.2. HOUSE PHYSICIAN pre-registration post, vacancy 24th January, 1958.

Applications, stating experience and copies of 2 testimonials, to Hospital Secretary.

BROMPTON HOSPITAL, S.W.3. Applications invited for post of TEMPORARY MEDICAL REGISTRAR (whole-time). Salary within the Registrar grade. Appointment is for 1 year and involves duties at a chest clinic under the South West Metropolitan Regional Hospital Board as well as Brompton Hospital. Candidates must hold the M.R.C.P. diploma or the M.B. of a university.

Applications, stating age, qualifications with dates, nationality, and appointments held, together with copies of testimonials, by 11th January, 1958, to KENNETH A. F. MILES, House Governor.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. RESIDENT HOUSE OFFICER required in Pædiatric Department. Post-registration appointment. Recognised for D.C.H. Appointment from 1st February, 1958.

Applications, with 2 testimonials, to Medical Director by 11th January, 1958.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. SENIOR HOUSE OFFICER in General Medicine required, with duties mainly in the Geriatric Department. Good facilities for higher examination, and insight into working of General Practice. Whole-time appointment for 6 months in first instance. Post vacant 1st February, 1958.

Applications, with 2 testimonials, to Medical Director by 11th January, 1958.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. SENIOR HOUSE OFFICER required in Department of Obstetrics and Gynæcology. Post-registration appointment recognised for D.Obst.R.C.O.G. and M.R.C.O.G. Post vacant 1st February, 1958.

Applications, with 2 testimonials, to Medical Director by 11th January, 1958.

DULWICH HOSPITAL, East Dulwich-grove, S.E.22. Applications invited for appointments as HOUSE OFFICERS (general surgical duties). Recognised pre-registration posts vacant now.

Apply, giving age, qualifications and previous post (if any) details, with names of 2 referees or copy testimonials, to Group Secretary, Camberwell Hospital Management Committee, Dulwich Hospital.

FULHAM HOSPITAL, St. Dunstan's-road, Hammersmith, London, W.6.

HOUSE SURGEON (2 vacancies). Provisionally registered candidates eligible. Appointments recognised for F.R.C.S.

HOUSE PHYSICIAN (3 vacancies). Provisionally registered candidates eligible.

Appointments commence 1st February, are resident, and are limited to 6 months.

Applications by 13th January, on forms obtainable from the Hospital Secretary. (117 L.)

GUY'S HOSPITAL AND THE SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited to fill the established vacancy for a SENIOR REGISTRAR in Diagnostic Radiology to the Board of Governors of Guy's Hospital and the South East Metropolitan Regional Hospital Board, in the Bromley Group, on an exchange basis during a 4-year tenure of the post. The appointment will be made jointly by the bodies concerned. The post, which will be reviewed annually, is subject to the terms and conditions of service of hospital medical and dental staff (England and Wales) with duties commencing on 1st March, 1958.

Forms of application are obtainable, from and should be lodged with, the Superintendent, Guy's Hospital, London Bridge, S.E.1, not later than 25th January, 1958.

HIGHLANDS GENERAL HOSPITAL, Winchmore Hill, N.21. HOUSE SURGEON required. Vacant 18th January, 1958. Duties mainly orthopædic with some E.N.T. and emergency general surgery. New operating-theatre, outpatient and casualty department. Post recognised for pre-registration service.

Applications, with copies of 3 testimonials and name and address of 1 referee, to Hospital Secretary.

HOSPITAL FOR WOMEN, Soho-square, W.1. (Affiliated to the Middlesex Hospital.) Applications are invited for a full-time post of RESIDENT SENIOR GYNÆCOLOGICAL HOUSE OFFICER, vacant on 1st April, 1958. Appointment is for 6 months but the holder can apply for an extension of 6 months. Salary in accordance with the terms laid down for medical and dental staffs, less a deduction of £150 p.a. for residential emoluments. The appointment is recognised for the M.R.C.O.G. examination.

Applications, stating age, nationality, qualifications and experience, supported by the names and addresses of 2 referees, must reach the undersigned not later than Wednesday, 15th January. D. C. EMERY, Secretary.

HAMPSTEAD GENERAL HOSPITAL, Haverstock Hill, N.W.3. (ROYAL FREE HOSPITAL GROUP.) Applications are invited from suitably qualified medical practitioners for the post of CLINICAL ASSISTANT to the Ophthalmic Department (part-time Medical Officer grade) for 2 sessions a week, Wednesday mornings and Friday mornings.

Application forms may be obtained from the Secretary, to whom they should be returned immediately.

HITHER GREEN HOSPITAL, London, S.E.13. Lewisham GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (infectious diseases and general medicine), vacant 30th January. The appointment is tenable for 1 year and may be either fully resident or resident only when on duty.

Applications, stating age, qualifications and experience, with copy of testimonials or names of referees, to the Group Secretary at Lewisham Hospital, S.E.13.

LEWISHAM GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER to the E.N.T. Surgical Unit of the above group of hospitals. The appointment, which is vacant immediately, will include the care of a special inpatient unit of 50 Beds dealing with all types of surgery in the specialty at Hither Green Hospital.

Applications, stating age, qualifications and experience, with copy testimonials or names of referees, to the Group Secretary at Lewisham Hospital, London, S.E.13.

LEWISHAM HOSPITAL, London, S.E.13. Applications are invited for the post of SENIOR HOUSE OFFICER (urology), vacant 27th January and recognised for 6 months' training for F.R.C.S. Salary £819 10s. p.a., less £150 for emoluments if resident.

Applications, stating age, qualifications and experience, with copy testimonials or names of referees, to the Group Secretary, Lewisham Hospital, S.E.13.

MARIE CURIE HOSPITAL, 66, Fitzjohn's-avenue, Hampstead, N.W.3. HAREFIELD AND NORTHWOOD GROUP HOSPITAL MANAGEMENT COMMITTEE. RESIDENT MEDICAL OFFICER (Senior House Officer grade) required immediately.

Applications, with copies of testimonials, to the Administrative Officer by the 14th January, 1958.

MIDDLESEX HOSPITAL, W.1. Applications invited for post of SENIOR HOUSE OFFICER at St. Luke's-Woodside Hospital, N.10, vacant 1st April. This is the inpatient department of psychological medicine of the Middlesex Hospital and is recognised for part of the training for the D.P.M. examination.

Forms of application obtainable from Deputy Superintendent, The Middlesex Hospital, should be returned naming 2 referees by 31st January.

MIDDLESEX HOSPITAL, W.1. Applications invited for post of SENIOR REGISTRAR in Anæsthetics.

Rules and application forms obtainable from Deputy Superintendent should be returned, naming 2 referees, by 31st January.

MILDMAY MISSION HOSPITAL, Austin-street, London, E.2. Applications are invited for the pre-registration post of RESIDENT HOUSE SURGEON (post recognised for F.R.C.S.), vacant on 31st January, 1958. Candidates should be in sympathy with the evangelical Christian aims of the Hospital.

Applications and references to be addressed to the Medical Superintendent as soon as possible.

NORTH MIDDLESEX HOSPITAL, London, N.18. CASUALTY OFFICER (Senior House Officer grade). 6-months appointment, starting 5th February, 1958. Non-resident post. Recognised for F.R.C.S. 3 Casualty Officers employed; duties include service with the 3 main surgical units.

Applications, stating age, qualifications, experience, together with copies of recent testimonials and/or names of 2 referees, to Hospital Secretary, by 15th January, 1958.

NORTH MIDDLESEX HOSPITAL, London, N.18. Applications are invited from pre- and post-registration candidates for the post of RESIDENT OBSTETRIC AND GYNÆCOLOGICAL HOUSE SURGEON. 6-months appointment from 1st February, 1958. Post recognised by R.C.O.G. for diploma and as a combined post for membership. Candidates must have held house appointment in either medicine or surgery. Large Obstetric and Gynæcology Department.

Applications (in own handwriting), giving full particulars together with copies of recent testimonials, to Hospital Secretary by 11th January, 1958.

PRINCESS BEATRICE HOSPITAL, Earl's Court, S.W.5. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. SURGICAL REGISTRAR (general surgery). Resident.

Application forms from the Group Secretary, St. Luke's Hospital, Sydney-street, Chelsea, S.W.3, to be returned within 14 days. (Enclose stamped addressed foolscap envelope.)

QUEEN ELIZABETH HOSPITAL FOR CHILDREN, Hackney-road, E.2, Shadwell, E.1, BANSTEAD, SURREY. HOUSE OFFICER appointment for 2 consecutive periods of 6 months, commencing 1st March, 1958, first period House Physician, Shadwell, second period House Surgeon, Banstead, and Casualty Officer, Hackney-road.

Application forms may be obtained from the Secretary at Hackney-road, and should be returned with copies of not more than 3 testimonials, not later than 17th January, 1958.

ST. ANDREW'S HOSPITAL, Bow, E.3. Senior House OFFICER (orthopædic, E.N.T. and emergency general surgery) required. Post recognised for 6 months' training in general surgery for F.R.C.S.

Applications, with copy of at least 1 testimonial, to Group Secretary, Bow Group Hospital Management Committee, 2A, Bow-road, London, E.3, immediately.

ST. GILES' HOSPITAL, Camberwell, S.E.5. House OFFICER (orthopædic duties) required. Recognised pre-registration post vacant now.

Applications, with names of 2 referees or copy testimonials, to Group Secretary, Camberwell Hospital Management Committee, Dulwich Hospital, East Dulwich-grove, S.E.22.

ROYAL FREE HOSPITAL. Applications are invited for 3 ASSISTANTS in the Department of Pathology. The successful candidates will be required to work under the direction of the Professor of Pathology and assist in the routine work in morbid anatomy, and also assist in a research project, either on liver or ischæmic heart disease. The appointment will be made for 1 year in the first instance, commencing 1st April, 1958, and preference will be given to candidates with a postgraduate degree and previous experience in pathology; these latter 2 qualifications are not essential, and the appointment can be considered as a training post. Salary will be £935 p.a. and will carry superannuation.

Applications should be sent to the Professor of Pathology, Royal Free Hospital, Gray's Inn-road, London, W.C.1, with the names of 2 referees, before 1st March, 1958.

ROYAL MARSDEN HOSPITAL, Fulham-road, S.W.3. Applications are invited for the post of REGISTRAR or SENIOR REGISTRAR (E.N.T. Department). The post which is for 4 sessions a week on fixed days is for 1 year, the holder eligible for reappointment. Candidates must hold the Diploma of F.R.C.S.

Application forms are obtainable from the House Governor, to whom applications, together with names of 3 referees, should be sent not later than 10th January.

ROYAL NORTHERN HOSPITAL, Holloway, N.7. Applications are invited for the post of SENIOR HOUSE OFFICER (orthopædic) vacant beginning February, 1958. Occasional casualty duties. Recognised for F.R.C.S.

Applications, with copies of recent testimonials, to be sent to the Hospital Secretary by 14th January 1958.

ST. JAMES' HOSPITAL, Balham, London, S.W.12. 2 HOUSE PHYSICIANS required. 1 post vacant on 21st January (post-registration candidates); the other post vacant on 13th February (pre-registration candidates eligible).

Applications to Group Secretary, Wandsworth Hospital Group, at above address by 13th January, stating age, qualifications, experience and names of 2 referees.

ST. JAMES' HOSPITAL, Balham, London, S.W.12. HOUSE SURGEON (gynæcology). Post vacant 9th March.

Applications, stating age, qualifications, experience and names of 2 referees, to Group Secretary, Wandsworth Hospital Group, at above address by 18th January.

ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN, Lisle-street, Leicester-square, London, W.C.2. Applications are invited for the post of Whole-time REGISTRAR in the Department of Pathology. The person appointed will have special facilities to study histopathology of the skin. Previous experience in pathology desirable but not essential.

Applications, stating age, nationality, qualifications, and experience, with names of 3 referees, to the Secretary to the Board of Governors by 10th January, 1958.

ST. THOMAS'S HOSPITAL and the SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. (Joint appointment.) Whole-time SENIOR REGISTRAR to the Children's Department at St. Thomas's and the Lambeth Hospitals. For 1 year in the first instance from 1st April, 1958. 8 sessions per week at St. Thomas's Hospital and 3 sessions per week at the Lambeth Hospital.

Applications (7 copies), naming 3 referees, to Clerk of the Governors, St. Thomas's Hospital, London, S.E.1, by 17th January, 1958.

UNIVERSITY COLLEGE HOSPITAL, Gower-street, W.C.1. Applications are invited for the appointment of GERIATRIC REGISTRAR for 1 year in the first instance from 1st March, 1958.

Applications, with the names of 2 referees, to T. F. W. MACKEOWN, Administrator and Secretary, by 17th January, 1958.

UNIVERSITY COLLEGE HOSPITAL, Gower-street, W.C.1. Applications are invited for the post of Whole-time SENIOR REGISTRAR in Anæsthetics from 1st March 1958 (non-resident). The post is interchangeable with a Senior Anæsthetic Registrarship at the Hospital for Sick Children, Great Ormond-street, for periods of 6 months.

Applications, with names of 2 referees, to T. F. W. MACKEOWN, Administrator and Secretary, by 17th January, 1958.

WEST LONDON HOSPITAL, Hammersmith-road, London, W.6. RESIDENT HOUSE SURGEON (general and genito-urinary) required end January. Pre-registration candidates considered.

Applications, stating age, qualifications, experience, copies 2 recent testimonials, to Secretary, by 11th January.

ALTON GENERAL HOSPITAL, Alton. (136 Beds—acute general.) RESIDENT HOUSE SURGEON required for general surgical duties. Post suitable for pre-registration candidates. Vacant immediately. Recognised for F.R.C.S. 6-month appointment.

Applications and copies of testimonials to the Hospital Secretary.

ALTRINCHAM GENERAL HOSPITAL. Assistant Senior SURGICAL OFFICER (Junior Hospital Medical Officer grade). Applications are invited for this post in a hospital of 130 acute beds with a busy Casualty Department. The appointee would be required to exercise control of this Department and also to assist Resident Surgical Officer with the general surgical work of the hospital. The post offers excellent opportunities of practical experience and postgraduate study to suitably qualified candidates and particularly those studying for higher surgical qualifications.

Applications, with names of 2 referees, to Group Secretary, North and Mid-Cheshire Hospital Management Committee, Sinderland Road, Altrincham, Cheshire.

BARNSLEY. BECKETT HOSPITAL. Applications are invited for the post of RESIDENT HOUSE SURGEON (surgical), pre-registration post. Vacant now. The post offers excellent facilities for gaining experience.

Applications, naming 2 referees, to the Group Secretary, Barnsley Hospital Management Committee, 33, Gawber-road, Barnsley.

AYLESBURY. BUCKINGHAMSHIRE. STOKE MANDEVILLE HOSPITAL. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER in the National Spinal Injuries Centre. This post offers apart from experience in general surgery and medicine, specialised experience in neurology, urology, physical medicine and rehabilitation.

Full details of the duties can be obtained from the Administrative Officer, Stoke Mandeville Hospital, to whom applications should be sent by 31st January, 1958.

BARNSTAPLE. NORTH DEVON INFIRMARY. (105 Beds.) HOUSE SURGEON (pre-registration); vacant now. The Hospital serves a wide area of pleasant countryside and the post affords good opportunity to study excellent clinical material.

Apply to Group Secretary, 19, Alexandra-road, Barnstaple.

BEDFORD GENERAL HOSPITAL. (436 Beds.) Resident pre-registration HOUSE PHYSICIAN required end January.

Applications, stating age, qualifications, experience, copies of 2 recent testimonials, to Group Secretary, Bedford Group Hospital Management Committee, 3, Kimbolton-road, Bedford.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 acute beds.) SENIOR HOUSE OFFICER in Obstetrics and Gynæcology. Vacant soon. Hospital has Maternity Unit of 22 beds and Gynæcological Annexe of 18 beds. Married quarters may be available.

Detailed applications to Group Secretary.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. (229 Beds.) HOUSE PHYSICIAN (House Officer or Senior House Officer grading according to experience).

Apply Group Secretary.

BIRMINGHAM ACCIDENT HOSPITAL, Bath-row, BIRMINGHAM, 15. (215 Beds and 8 House Surgeons.) HOUSE SURGEONS (resident). Vacant January/February. Hospital is largest traumatic unit in country and treats over 50,000 new patients each year. Recognised for purpose of casualty by R.C.S. (Eng.). Teaching programme by consultant staff. 6-month appointment, some of which may be spent in 42-Bedded Medical Research Council's Burns Unit.

Apply, naming 2 referees, to Administrator.

BIRMINGHAM, 18. ALL SAINTS' HOSPITAL. Senior HOUSE OFFICER (resident) required (Male or Female). The Hospital is associated with Birmingham University for teaching of psychiatry. Training for Diploma in Psychological Medicine provided.

Applications, stating age, qualifications, to the Medical Superintendent.

BIRMINGHAM, 18. DUDLEY ROAD HOSPITAL. SENIOR HOUSE OFFICER in Obstetrics and Gynæcology required 1st March, 1958. Recognised for M.R.C.O.G. Department under control of 3 Consultant Obstetricians and has 115 maternity beds with 100 neonatal cots and 60 gynæcological beds.

Detailed applications to Group Secretary with copies of 3 recent testimonials.

BIRMINGHAM, 9. LITTLE BROMWICH GENERAL HOSPITAL. HOUSE PHYSICIAN (Male/Female). Vacant 12th January, 1958. Pre-registration post.

Apply Physician-Superintendent with copies of 2 testimonials or names of referees.

BIRMINGHAM, 9. LITTLE BROMWICH GENERAL HOSPITAL. HOUSE SURGEON (Male/Female). Vacant 7th January, 1958. Pre-registration post.

Apply Physician-Superintendent with copies of 2 testimonials or names of referees.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. The following resident appointments are available for the 6-month period commencing 7th January, 1958. Recognised for pre-registration candidates but registered medical practitioners may apply.

The Queen Elizabeth Hospital

HOUSE SURGEONS (2) to the E.N.T. Department. One of these posts is interchangeable with the Surgical Professorial Unit for the last 3 months of the appointment.

General Hospital

HOUSE SURGEON to the Casualty Department, with duties also to the Orthopædic Surgeon. (The last 3 months of this appointment will be served as House Surgeon to the Urological Surgeon at the Queen Elizabeth Hospital.)

HOUSE SURGEON to the Gynæcological Department.

HOUSE SURGEON to the E.N.T. Department.

Children's Hospital

HOUSE SURGEONS (2). These posts rotate between the 3 main surgical wards, to give experience in all branches of surgery.

Midland Nerve Hospital

HOUSE PHYSICIAN (or Senior House Officer). This appointment is recognised as a training post for the D.P.M. (Conjoint) in psychiatry and neurology.

Forms of application may be obtained from the undersigned.

G. A. PHALP,
Secretary and Principal Administrative Officer.
The United Birmingham Hospitals,
The Queen Elizabeth Hospital, Birmingham, 15.

BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER required immediately for established Geriatric Department under control of Consultant Geriatrician. There are 360 geriatric beds at Queen's Park Hospital, Blackburn, Springfield Hospital, Blackburn, and Clitheroe Hospital, Clitheroe. Accommodation for married man may be available if required.

Applications, with names and addresses of 2 referees, to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BRADFORD CHILDREN'S HOSPITAL, Yorkshire. Senior HOUSE OFFICER (Male or Female), vacant 1st February, 1958. Recognised for D.C.H.

Applications, stating age, nationality, qualifications and experience with copy testimonials, to Secretary, Royal Infirmary, Bradford.

BISHOP AUCKLAND, Co. DURHAM. THE GENERAL HOSPITAL. (350 Beds.) HOUSE SURGEON required. Recognised pre-registration appointment. Accommodation available for married officer with no children.

Apply, naming 2 referees, to K. G. T. LUXFORD, Group Secretary, South West Durham Hospital Management Committee at the above address.

BOLTON DISTRICT GENERAL HOSPITAL (Townleys BRANCH PSYCHIATRIC UNIT). SENIOR HOUSE OFFICER in Psychiatry (resident). Unit is attached to a General Hospital. Consultant Psychiatrist in charge. All forms of modern treatment in use. Post offers excellent facilities for anyone desiring to specialise in psychiatry and attend D.P.M. course at Manchester University. Hospital also recognised for London and Irish D.P.M. Outpatient Clinics in existence. Vacant 1st February and tenable for 12 months.

Applications, stating age, nationality, qualifications, experience and the names of 2 referees, to Group Secretary, Bolton and District Hospital Management Committee, The Royal Infirmary, Bolton.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road, BOSCOMBE. (494 Beds.) BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of REGISTRAR in Pathology for post becoming vacant on 4th February, 1958. The successful applicant will have opportunities for gaining experience in all 4 departments of the Laboratory which is recognised for the Diploma in Pathology. The post may be resident or non-resident as desired.

Forms of application, obtainable from the Group Secretary, Hospital Management Committee Office, Royal Victoria Hospital, Gloucester-road, Boscombe, should be returned to him duly completed, within 14 days of the appearance of this advertisement.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road. BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of GENERAL HOUSE SURGEON. The post which becomes vacant on 30th January, 1958, is recognised for the F.R.C.S. examination and for pre-registration purposes.

Application to the Hospital Secretary.

BRIDGEND GENERAL HOSPITAL, Quarella-road, BRIDGEND. (381 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics). This Hospital is recognised for the examinations of the F.F.A. R.C.S.

Applications, naming 2 referees, to be addressed to the Group Secretary, Mid Glamorgan Hospital Management Committee, 8, Wind-street, Neath.

BRIGHTON. ROYAL SUSSEX COUNTY HOSPITAL. (314 Beds.) CASUALTY HOUSE SURGEON required 22nd January. Duties include work in Orthopædic and Traumatic Unit. Recognised for pre-registration and F.R.C.S.

Applications, stating usual particulars and naming two referees, to the Administrative Officer, Royal Sussex County Hospital, Brighton.

BRIGHTON. ROYAL SUSSEX COUNTY HOSPITAL. SENIOR CASUALTY OFFICER (Junior Hospital Medical Officer), non-resident, required immediately, at the above Hospital. Recognised for F.R.C.S.

Applications as locum or for permanent post, stating usual particulars and the names of 2 referees, to the Administrative Officer.

BRIGHTON. ROYAL SUSSEX COUNTY HOSPITAL. (314 Beds.) HOUSE SURGEON (including gynæcology) required 1st February, 1958. Pre-registration and recognised for F.R.C.S.

Applications, stating usual particulars, and naming 2 referees, to the Administrative Officer, Royal Sussex County Hospital, Brighton, 7.

BRIGHTON. SUSSEX EYE HOSPITAL. (56 Beds.) HOUSE SURGEON required 11th February, 1958. Recognised for F.R.C.S. and D.O. Successful candidate will be considered for senior post (Senior House Officer) on completion of 6 months.

Applications, stating age, qualifications and experience and naming 2 referees, to the Administrative Officer.

BURY ST. EDMUNDS. WEST SUFFOLK GENERAL HOSPITAL. (262 Beds.) Applications are invited for the following posts:

(*a*) HOUSE OFFICER (pre-registration) or SENIOR HOUSE OFFICER for Orthopædic and Casualty duties; recognised for F.R.C.S. (surgical). Vacant January. A Junior Hospital Medical Officer is also employed.

(*b*) Locum tenens HOUSE SURGEONS (pre-registration) required for (i) Gynæcological and Obstetric duties and (ii) Orthopædic and Casualty duties for periods during the first 3 weeks of January.

Applications, with testimonials or names of 3 referees, to Hospital Secretary (Telephone: Bury St. Edmunds 2381).

BUXTON. DEVONSHIRE ROYAL HOSPITAL. (252 Beds.) Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER, vacant now. This Hospital is a large special hospital for the treatment and rehabilitation of all types of locomotor disorders. Duties are mainly medical and include work in the long-stay unit of the Manchester University Rheumatism Research Centre. The Hospital is recognised under the regulations for the Diploma in Physical Medicine, Part II, and the post also offers good medical experience.

Applications, stating age, experience and qualifications, together with the names of 2 persons for reference, to be addressed to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport, immediately

BURTON-ON-TRENT. THE GENERAL HOSPITAL. HOUSE SURGEON (orthopædics), for work in Casualty Department, required immediately. Flat available for married officer without children.

Applications to Group Secretary as soon as possible.

BURTON-ON-TRENT. THE GENERAL HOSPITAL. HOUSE SURGEON (general—pre-registration) required at the above Hospital immediately. Post recognised for F.R.C.S.

Applications to Group Secretary as soon as possible.

CAMBRIDGE. THE UNITED CAMBRIDGE HOSPITALS. The Board of Governors of the United Cambridge Hospitals wish to appoint a DIRECTOR to take charge of a survey which is to be conducted to study the demands made upon the hospital facilities of the Cambridge area. The appointment will be for 2 years at a salary at the rate of £1000 p.a. Applicants should have had experience of hospital administration and some knowledge of statistical methods.

Applications, giving details of age, qualifications and experience, and the names of 2 referees, to the Secretary to the Board of Governors, Addenbrooke's Hospital, Cambridge, from whom further particulars of the post may be obtained, by 18th January, 1958.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (277 Beds.) The post of SENIOR HOUSE PHYSICIAN will be vacant at Stodmarsh-road Annexe early in January, 1958; duties will include care of 30-Bedded unit of chest diseases, also work at the chest clinic and with the pneumoconiosis unit. National Health Service salary and conditions.

Applications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CANTERBURY. KENT AND CANTERBURY HOSPITAL (277 Beds). The post of GENERAL SURGICAL AND UROLOGICAL HOUSE SURGEON (pre-registration or third post), which is recognised for the F.R.C.S., becomes vacant at the end of January, 1958. National Health Service salary and conditions.

Applications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CARDIFF HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER in Obstetrics and Gynæcology required. Appointment recognised for M.R.C.O.G.

Form of application from Group Secretary, 44, Cathedral-road, Cardiff.

CARDIFF. ROOKWOOD HOSPITAL, Llandaff, Cardiff. JUNIOR HOSPITAL MEDICAL OFFICER (surgical) required. National Health Service terms and conditions.

Apply Medical Superintendent.

CARDIFF. THE UNITED CARDIFF HOSPITALS. Applications are invited for the appointment of SENIOR REGISTRAR in Surgery at the Cardiff Royal Infirmary, to commence mid-March, 1958.

Application forms are available from the Secretary to the Board at the Cardiff Royal Infirmary, Newport-road, Cardiff, and should be returned within 14 days of the appearance of this advertisement.

CARMARTHEN. WEST WALES GENERAL HOSPITAL. (188 Beds.) WEST WALES HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of pre-registration HOUSE OFFICER (surgical) (recognised by the Royal College of Surgeons, and for pre-registration service), which will become vacant on 1st February, 1958. Salary and conditions of service as laid down by the Ministry of Health.

Applications, stating age, qualifications, experience and nationality, with names and addresses of 3 referees, to the Group Secretary, West Wales Hospital Management Committee, Glangwili, Carmarthen.

CHELMSFORD AND ESSEX HOSPITAL. (161 Beds.) Applications are invited for the post of RESIDENT HOUSE SURGEON. Pre-registration post. The post offers good surgical experience. Recognised for the F.R.C.S.

Applications, together with 2 recent testimonials, to the Secretary, Chelmsford Hospital Management Committee, London-road, Chelmsford.

CHELMSFORD AND ESSEX AND ST. JOHN'S HOSPITALS. Resident Locum ANÆSTHETIC REGISTRAR required.

Applications to Secretary, Chelmsford Hospital Management Committee, London-road, Chelmsford, Essex.

CHERTSEY, SURREY. ST. PETER'S HOSPITAL (late Botleys Park War Hospital). (430 Beds.) SENIOR HOUSE OFFICER ANÆSTHETIST required February, 1958. Appointment recognised for D.A. and F.F.A.R.C.S. Salary in accordance with terms and conditions of National Health Service.

Applications, together with names and addresses of referees, to Physician-Superintendent, St. Peter's Hospital, as soon as possible.

CHERTSEY, SURREY. ST. PETER'S HOSPITAL (late Botleys Park War Hospital). (430 Beds.) RESIDENT HOUSE SURGEON (Senior House Officer or Intern) required for Gynæcological (30 Beds) and E.N.T. (approximately 14 Beds) Departments. Salary in accordance with terms and conditions of National Health Service. Post vacant 1st February, 1958.

Applications, together with names and addresses of referees, to Physician-Superintendent, St. Peter's Hospital, as soon as possible.

COLCHESTER GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for :—

Essex County Hospital, Colchester (189 Beds)

Post of HOUSE PHYSICIAN.

Post of HOUSE SURGEON. Recognised for F.R.C.S.

First, second, third or pre-registration posts, tenable for 6 months.

Black Notley Hospital, Braintree, Essex (516 Beds)

Post of HOUSE PHYSICIAN. Includes duties in medical and pædiatric wards.

Post of HOUSE SURGEON. Includes duties in general surgical and gynæcological wards. Recognised for F.R.C.S.

First, second, third or pre-registration posts; tenable for 6 months.

Applications, with copies of 3 testimonials, to Group Secretary, Colchester Group Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

CATERHAM, SURREY. ST. LAWRENCE'S (MENTAL DEFICIENCY) HOSPITAL. (2250 Beds.) JUNIOR HOSPITAL MEDICAL OFFICER required. Salary £852 10s.–£55–£1182 10s. Single residential accommodation available at a charge of £170 p.a.

Applications, giving full particulars and names of 2 referees, to Group Secretary.

CHICHESTER. ROYAL WEST SUSSEX HOSPITAL. Locum SURGICAL REGISTRAR required 20th–25th January, 1958.

Apply Group Secretary, 174, Broyle-road, Chichester.

CREWE AND DISTRICT MEMORIAL HOSPITAL. (140 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (surgical), vacant 26th January, 1958, which is recognised by the Royal College of Surgeons for the F.R.C.S. examination. This hospital has recently had a new twin theatre suite, and a new large Casualty Department added. There are 7 residents and ample opportunity for gaining experience in operative surgery will be afforded to the right candidate. Salary and conditions in accordance with Whitley Council scale.

Applications, stating age, qualifications, &c., with names of 2 referees, to be sent to the Group Secretary, Barony Hospital, Nantwich, Cheshire, within 10 days after publication.

CROYDON CHILD GUIDANCE CLINIC. South West METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of Whole-time SENIOR PSYCHIATRIC REGISTRAR for this Clinic, which is part of the community mental health services run by Warlingham Park Hospital. Candidates should hold the D.P.M. and have had good training and experience in child psychiatry. Opportunities also available for part-time experience and training in special types of adult inpatient and outpatient psychiatry. Single accommodation available in Warlingham Park Hospital if required.

Application forms obtainable from the Group Secretary, Warlingham Park Hospital, Warlingham, Surrey, should be returned within 21 days from the date of this advertisement. Candidates may visit the Clinic by arrangement with the Physician-Superintendent, Warlingham Park Hospital.

DERBY. DERBYSHIRE CHILDREN'S HOSPITAL. (86 Beds.) SENIOR HOUSE OFFICER (Pædiatrics) required. Vacant 15th February, 1958. Recognised for D.C.H.

Applications, stating full particulars with 2 names for reference, to be sent as soon as possible to Hospital Secretary.

DORKING GENERAL HOSPITAL, Horsham-road, DORKING, SURREY. (252 Beds.) Applications are invited from candidates possessing previous experience for the post of SENIOR HOUSE PHYSICIAN to the Department of Medicine. The medical firm consists of a visiting Consultant Physician, a full-time Physician and a resident House Physician (advertised post). Post vacant 1st February, 1958. The post offers wide experience in general medicine, and gives an excellent opportunity for candidates studying for M.R.C.P. Salary £819 10s. p.a., less £150 p.a. emoluments.

Applications to Medical Superintendent by 9th January.

DRIFFIELD, YORKSHIRE. EAST RIDING GENERAL HOSPITAL (247 Beds.) SENIOR HOUSE SURGEON. Vacant 20th January. Recognised for F.R.C.S. General surgery, some orthopædics. Good experience in emergency and general surgery, with time to read for a higher degree.

Detailed applications to Group Secretary, Westwood Hospital, Beverley, Yorkshire.

DUDLEY, STOURBRIDGE AND DISTRICT HOSPITAL GROUP, BIRMINGHAM REGION.

The Guest Hospital, Dudley (154 Beds)

HOUSE OFFICER (medical), pre-registration. Post vacant now.

SENIOR HOUSE OFFICER (surgical). Post vacant now.

The Corbett Hospital, Stourbridge (114 Beds)

HOUSE OFFICER (surgical), pre-registration. Post vacant January, 1958.

Wordsley Hospital, near Stourbridge (478 Beds)

SENIOR HOUSE OFFICER (medical), pre-registration. Post vacant 27th January, 1958.

HOUSE OFFICER (surgical), pre-registration. Post vacant January, 1958.

Apply Group Secretary, Guest Hospital, Dudley, Worcs.

DURHAM. COUNTY HOSPITAL. (116 Beds.) Senior HOUSE OFFICER in Orthopædics required immediately. Resident. The County Hospital is the main Orthopædic and Accident Hospital in a busy mining and industrial area. Experience can be obtained in all branches of orthopædics.

Applications, with particulars of previous experience and names of 2 referees, to Group Secretary, Dryburn Hospital, Durham.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. (715 Beds.) RESIDENT HOUSE PHYSICIAN for Thoracic and Dermatological Departments. Duties to include "taking in of acute general medical cases". 6-months appointment. Post vacant 27th January, 1958.

Applications, stating age, qualifications, experience and enclosing copies of up to 3 recent testimonials, to Medical Director of Hospital by 17th January, 1958.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. (715 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. REGISTRAR to Medical Department required at above Hospital. Good experience essential. Work to include care of inpatients under supervision of Senior Physician and work in Medical Outpatients Department. Hospital may be visited by direct arrangement with Medical Director.

Application forms obtainable from and returnable to Group Secretary, Hendon Group Hospital Management Committee, Edgware General Hospital, by 14th January, 1958.

EPSOM DISTRICT HOSPITAL, Dorking-road, Epsom, SURREY. RESIDENT HOUSE SURGEON required 12th February. Pre-registration post, recognised for F.R.C.S.

Applications, stating age, qualifications, and experience, with copies of 2 recent testimonials, should be sent as soon as possible to Group Secretary at above address.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. Applications are invited for the post of RESIDENT PATHOLOGIST (Senior House Officer Grade) for duties in the Area Laboratory and at other hospitals in the Group. The Area Laboratory is recognised for the Diploma of Pathology and offers opportunity for training in all branches of pathology. Further information can be obtained from the Senior Pathologist. Appointment vacant on 1st March, 1958, and tenable for 1 year.

Applications, stating age, qualifications, experience, nationality, and the names of 2 referees, to the Group Secretary, Enfield Group Hospital Management Committee, not later than 18th January, 1958.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. RESIDENT HOUSE SURGEON (approved pre-registration post). Vacant 16th February, 1958. Duties with general surgical unit. Recognised by Royal College of Surgeons. 6 months' appointment.

Applications, with the names and addresses of 2 referees, to Group Secretary, Enfield Group Hospital Management Committee, Chase Farm Hospital, by 18th January, 1958.

EXETER. ROYAL DEVON AND EXETER HOSPITAL. Applications are invited from registered medical practitioners for the appointment of SENIOR HOUSE OFFICER (E.N.T. Department—30 Beds). Vacant 11th February, 1958. The post is recognised for the F.R.C.S. examination.

Applications, with copies of 2 recent testimonials, to the Hospital Secretary.

GLASGOW, E.3. ROBROYSTON HOSPITAL. Junior HOSPITAL MEDICAL OFFICER required. Resident or non-resident. The work carried out consists mainly of tuberculous pulmonary disease though substantial units exist for skeletal and urological tuberculosis. A small unit exists for acute respiratory diseases and there are also units for non-tuberculous chest diseases and for geriatrics.

Applications should be forwarded to the Physician-Superintendent.

GLASGOW ROYAL INFIRMARY. Senior House Officer in E.N.T. Department. Duties at above infirmary.

Write, giving 3 names for reference, not later than 11th January, 1958, to the Secretary, Board of Management for Glasgow Royal Infirmary and Associated Hospitals, 135, Buchanan-street, Glasgow, C.1.

GLASGOW ROYAL INFIRMARY. Senior House Officer in General Medicine. Duties at above infirmary.

Write, giving 3 names for reference, not later than 11th January, 1958, to the Secretary, Board of Management for Glasgow Royal Infirmary and Associated Hospitals, 135, Buchanan-street, Glasgow, C.1.

GLASGOW. WESTERN DISTRICT HOSPITAL, 63, Possil-road, Glasgow, C.4. RESIDENT HOUSE OFFICERS (2) required for the Surgical Unit at above Hospital, for period 1st February to 31st July, 1958. Pre-registration posts. Active unit with busy Outpatient Department.

Applications to the Medical Superintendent.

GLOUCESTER. HORTON ROAD AND CONEY HILL HOSPITALS. (1540 Beds.) Applications invited for the appointment of a JUNIOR HOSPITAL MEDICAL OFFICER. Hospitals serve the North Gloucestershire Clinical Area, including Gloucester, Cheltenham, Stroud and Forest of Dean. High admission rate (850). All modern methods of treatment. New units provided for treatment of neurosis and alcoholism. Expanding outpatient services, day-hospital, long stay annexes and social clubs. Encouragement and opportunity for study. Salary and conditions Whitley Council. Single accommodation available. Married accommodation a possibility.

Applications, with names of 3 referees, to Physician-Superintendent within 14 days.

HAVERFORDWEST. PEMBROKE COUNTY WAR MEMORIAL HOSPITAL. (163 Beds.) WEST WALES HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (general surgery) (recognised by the Royal College of Surgeons). Salary and conditions of service as laid down by the Ministry of Health.

Applications, stating age, qualifications, experience and nationality, with names and addresses of 3 referees, to the Group Secretary, West Wales Hospital Management Committee, Glangwili, Carmarthen.

HAVERFORDWEST. PEMBROKE COUNTY WAR MEMORIAL HOSPITAL. (163 Beds.) WEST WALES HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of pre-registration HOUSE OFFICER (surgical) (recognised by the Royal College of Surgeons, and for pre-registration service), which will become vacant on 1st February, 1958. Salary and conditions of service as laid down by the Ministry of Health.

Applications, stating age, qualifications, experience and nationality, with names and addresses of 3 referees, to the Group Secretary, West Wales Hospital Management Committee, Glangwili, Carmarthen.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from provisionally registered medical practitioners for the post of HOUSE PHYSICIAN, to commence duties on 1st February, 1958. Salary in accordance with national scales.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON,
Secretary to the Management Committee.

The Royal Infirmary, Huddersfield.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required to commence duty on 16th January, 1958. The post is recognised as a pre-registration appointment and for the F.R.C.S. Salary in accordance with national scales.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON,
Secretary to the Management Committee.

The Royal Infirmary, Huddersfield.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) Applications are invited for the post of CASUALTY OFFICER. The post, which is resident, is recognised under the Fellowship regulations and will be graded either Junior Hospital Medical Officer or Senior House Officer according to experience. Duties terminate at 7 P.M. with 1 night weekly on call.

Applications for the appointment, which will be vacant on 23rd January, 1958, should be accompanied by copies of 3 recent testimonials and addressed to the undersigned.

H. J. JOHNSON, Group Secretary.

The Royal Infirmary, Huddersfield.

HUDDERSFIELD. ST. LUKE'S HOSPITAL. (235 Beds.) Applications are invited for the post of RESIDENT MEDICAL OFFICER (Junior Hospital Medical Officer grade) at the above Hospital, to commence duties immediately. The Group Geriatric Admission Unit is based on this Hospital, which also caters for acute medical and surgical, pædiatric and maternity patients. Salary in accordance with the terms and conditions of service for hospital medical and dental staff, £852 10s.–£55–£1182 10s. p.a. House available for married candidate.

Applications, together with copies of 3 recent testimonials, to be sent to the undersigned as soon as possible.

H. J. JOHNSON,
Secretary to the Management Committee.

The Royal Infirmary, Huddersfield.

HASTINGS GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum SENIOR HOUSE OFFICER (anæsthetics) required for duties within the Group. Married quarters available if required. Post vacant from 1st January, 1958. Salary £15 19s. per week.

Apply to Group Secretary, 11, Holmesdale-gardens, Hastings, giving details of qualifications, experience, and names of referees.

HEMEL HEMPSTEAD, HERTFORDSHIRE. WEST HERTS HOSPITAL. HOUSE SURGEON (pre-registration) required.

Applications, giving full details and 2 names for reference, should be sent to the Hospital Secretary as soon as possible.

HEMEL HEMPSTEAD. WEST HERTS HOSPITAL. NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. ANÆSTHETIC REGISTRAR required at above Hospital. New post.

Application form obtainable from and returnable to Secretary, West Herts Group Hospital Management Committee, 9, Rickmansworth-road, Watford, Herts, by not later than 14th January, 1958.

HULL. KINGSTON GENERAL HOSPITAL. (419 Beds.) HULL A GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of resident JUNIOR HOUSE PHYSICIAN (pre-registration post).

Applications, with 2 recent testimonials, to the Hospital Secretary.

HULL. VICTORIA HOSPITAL FOR SICK CHILDREN, Park-street. SENIOR HOUSE OFFICER required to commence on 3rd February, 1958. Duties are those of Casualty Officer and offer good experience. The successful candidate will be expected to supervise the other Junior House Officers.

Apply, giving testimonials, to the Hospital Secretary at the above address.

HULL. VICTORIA HOSPITAL FOR SICK CHILDREN, Park-street. Pre-registration or registration post. HOUSE SURGEON required on 28th January, 1958. An interesting and varied post which includes outpatient and casualty work.

Applications, together with details of experience, testimonials, &c., to the Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL (Anglesea-ROAD WING). (356 Beds.) Applications are invited for the post of HOUSE SURGEON to the Senior Consultant General Surgeon, vacant mid-January. The post is recognised for pre-registration and for the F.R.C.S. examinations.

Applications, with copies of recent testimonials, to Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL (Anglesea-ROAD WING). (356 Beds.) Applications are invited for 2 posts of HOUSE SURGEON to Consultant General Surgeons, both vacant mid-January. The posts are recognised for pre-registration and for the F.R.C.S. examinations.

Applications, with copies of recent testimonials, to Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL (Heath-road WING), IPSWICH. (280 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER to the Fracture and Orthopædic Department. The post, which becomes vacant at the end of January, is recognised for the R.C.S. examinations.

Applications, with full details and copies of recent testimonials, to the Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL (Heath-road WING), IPSWICH. Applications invited for 2 posts of HOUSE SURGEON, pre-registration, to general surgeons. Posts become vacant on 7th and 17th January, 1958, and are recognised for F.R.C.S. examination.

Detailed applications, with copies of recent testimonials, to Hospital Secretary.

IRVINE. AYRSHIRE CENTRAL HOSPITAL. Resident JUNIOR HOSPITAL MEDICAL OFFICER required 1st February. Infectious Diseases Unit.

Applications, stating qualifications and experience and giving names of 2 referees, to Area Medical Superintendent, 1, Hill-street, Kilmarnock.

ISLEWORTH. WEST MIDDLESEX HOSPITAL SUR-GICAL ANNEXE (at SOUTH MIDDLESEX HOSPITAL). HOUSE SURGEON, pre-registration—West Middlesex Hospital Surgical Annexe (30 Beds) at South Middlesex Hospital. Duties include some assistance on infectious diseases medical unit. Post vacant January, 1958.

Applications, stating age, qualifications and experience with copies of up to 2 recent testimonials, to Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 14th January, 1958.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. North WEST METROPOLITAN REGIONAL HOSPITAL BOARD. SURGICAL REGISTRAR (whole-time). Candidates may visit hospital by direct appointment.

Application forms obtainable from and returnable to Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 14th January, 1958.

ILFORD. KING GEORGE HOSPITAL. (General Hospital —211 Beds). There will be a vacancy for a SENIOR HOUSE OFFICER, Orthopædic Department at above Hospital, on 20th January, 1958. Salary will be at the rate of £819 10s. p.a., less emoluments. Recognised for the F.R.C.S.

Applicants should have been registered not less than 1 year and should send applications, accompanied by copies of 3 testimonials, to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Group Secretary, Ilford and Barking Group Hospital Management Committee, King George Hospital.

ISLE OF WIGHT GROUP HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (resident) required as House Surgeon and to assist Casualty Officer. Salary £819 10s. p.a.

Applications, with names of 2 referees, to Hospital Secretary, Royal Isle of Wight County Hospital, Ryde, not later than 17th January.

KETTERING AND DISTRICT GENERAL HOSPITAL. CASUALTY OFFICER (Senior House Officer). Recognised for F.R.C.S. The post, vacant immediately, offers wide experience of all traumatic conditions including fractures and some orthopaedic cases with charge of 30 Beds.

Applications, accompanied by testimonials, to be sent to the Group Secretary, General Hospital, Kettering.

LEEDS REGIONAL HOSPITAL BOARD. Senior Regis-TRAR in Psychiatry for duties at:—

(i) Storthes Hall Hospital, Kirkburton, near Huddersfield (2600 Beds), and associated clinics. Duties will also include visits to the neurological and E.E.G. unit at the General Infirmary at Leeds. Resident or non-resident.

(ii) De la Pole Hospital, Willerby, Hull (1000 Beds.) This hospital has a high admission-rate and a separate neurosis unit for females. Duties also include visits to the psychiatric day centre, Hull, and an outpatient clinic at Goole. Small flat available for married person, otherwise non-resident.

Successful candidates for both appointments will undertake 2 clinical sessions (which may include research) in association with the Department of Psychiatry of the University of Leeds. Candidates for both these appointments should hold the D.P.M. or equivalent qualification.

Applications, stating age, qualifications and details of appointments held, showing dates, together with the names and addresses of 3 referees, should be forwarded to the Secretary, Park-parade, Harrogate, by 22nd January, 1958.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

Anæsthetics

Leeds A and B Groups. Recognised for F.F.A.R.C.S. and D.A. Resident.

General Surgery

St. James's Hospital, Leeds (124 general surgical beds).

General/Plastic Surgery

St. Luke's Hospital, Bradford (150 general surgical and 20 plastic surgical beds). Preferably resident.

Obstetrics and Gynæcology

York A Group (80 obstetric and 75 gynæcological beds). Recognised for M.R.C.O.G.

Psychiatry

(i) Menston Hospital, near Leeds (2500 Beds). Residential accommodation can be provided for a single person.

(ii) Oulton Hall Hospital, near Wakefield, and affiliated Mental Deficiency Colonies (approximately 400 Beds). Non-resident.

(iii) Psychiatric Unit, St. James's Hospital, Leeds. Offers special opportunity for experience with neurotic and psychosomatic patients and the Unit works in close association with the Department of Psychiatry. Resident or non-resident.

(iv) Storthes Hall Hospital, Huddersfield (2750 Beds).

If desired, facilities for attendance at the Leeds University will be provided, if the successful candidates are studying for the D.P.M.

Rheumatism Research

The Leeds Regional Hospital Board in association with the University of Leeds invites applications for the post of Research Registrar in Rheumatism to assist the Professor of Clinical Medicine with research projects at the Royal Bath Hospital, Harrogate, which is the centre for the Regional Rheumatism Scheme, or elsewhere in the Region.

Applications, stating age, sex, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 15th January, 1958.

LEEDS REGIONAL HOSPITAL BOARD. Short-term LOCUM TENENS appointments in the Registrar grade are constantly available at hospitals in the area of the Board, particularly in the specialties of anæsthetics, general medicine, general and orthopædic surgery, and psychiatry.

Interested practitioners, suitably experienced, should communicate with the Secretary, Joint Registrars Committee, Park-parade, Harrogate.

LEEDS. THE UNITED LEEDS HOSPITALS. The GENERAL INFIRMARY AT LEEDS. REGISTRAR in thoracic surgery required, from 1st April, 1958, for 1 year in the first instance.

Applications, stating age, experience, qualifications, previous posts with dates, and 3 names for reference, to be sent to the Sub-Dean, School of Medicine, Leeds, 2, by not later than 18th January, 1958.

LEEDS. THE UNITED LEEDS HOSPITALS. The GENERAL INFIRMARY AT LEEDS. 2 REGISTRARS in Urology required, 1 for general Urological duties, vacant 1st April, 1958, the other with special reference to work in connection with the Artificial Kidney, vacant now.

Applications, stating age, experience, qualifications, previous posts with dates, and 3 names for reference, stating also preference of post, to be sent to the Sub-Dean, The School of Medicine, Leeds, 2, by not later than 18th January, 1958.

LEEDS. UNITED LEEDS HOSPITALS/LEEDS REGIONAL HOSPITAL BOARD. SENIOR REGISTRAR vacancies.

Anæsthetics

Duties initially at Thoracic Surgical Units of the General Infirmary at Leeds and at Pinderfields General Hospital, Wakefield. The person appointed will be expected, if required, to interchange duties with the Senior Registrar in the Department of Anæsthetics at the General Infirmary.

Obstetrics and Gynæcology

Appointment will be made jointly to the Teaching and to Regional Hospitals. Initially the appointment will be to the Leeds A Group, but subject to satisfactory progress, a year's training will be given at the Teaching Hospital, probably in the third or fourth year.

Applications, stating age, qualifications and details of present and previous appointments, with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 22nd January, 1958.

LEIGH INFIRMARY, Leigh. House Physician, pre-regis-tration post, vacant early January.

Applications, with names of 2 referees, to Secretary, Wigan and Leigh Hospital Management Committee, Knowsley House, Wigan.

COUNTY HOSPITAL, LINCOLN, Sewell-road (200 Beds.) Applications are invited from pre-registration candidates for appointment as HOUSE SURGEON for 6 months, commencing in February, 1958, to be followed, if satisfactory, by appointment as House Physician for a further 6 months. Full particulars should be sent to:—R. W. HOWICK, Group Secretary.

LINCOLN. ST. GEORGE'S HOSPITAL. (242 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (pædiatrics) required. Duties include care of newborn and premature babies, exchange transfusions, neonatal surgery and duties at a maternity unit at Lincoln County Hospital. This post offers excellent opportunity for the study of metabolic diseases in childhood and infancy. A new cubicled unit is being opened. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 13th January, 1958, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

LIVERPOOL RADIUM INSTITUTE, 1, Myrtle-street, LIVERPOOL, 7. Applications are invited for a RESIDENT post in the Junior Hospital Medical Officer grade. Salary Scale £852 10s.–£55–£1182 10s. according to experience. This appointment is particularly valuable to practitioners who contemplate adopting radiotherapy as a special career. On the other hand, it provides an excellent opportunity for studying for a higher qualification either in medicine or in surgery.

Applications, giving particulars of age and experience, together with names and addresses of 2 referees, should reach the Medical Director as soon as possible.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. ROYAL LIVERPOOL CHILDREN'S HOSPITAL. Applications are invited for the post of SENIOR CASUALTY OFFICER (Senior House Officer grade), resident or non-resident, for the year 1st April, 1958, to 31st March, 1959.

Apply by 15th January, 1958, on form obtainable from the Secretary, The United Liverpool Hospitals, 80, Rodney-street, Liverpool, 1.

LUTON AND DUNSTABLE HOSPITAL. (250 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. ANÆSTHETIC REGISTRAR required at the above Hospital and associated units for a 1- or 2-year appointment. Post recognised for D.A. and F.F.A.R.C.S., and vacant 1st January, 1958. The Hospital may be visited by direct appointment.

Application forms obtainable from Secretary, Luton and Hitchin Group Hospital Management Committee, St. Mary's Hospital, Luton, Beds.

LYMINGTON HOSPITAL, Lymington, Hampshire. (95 Beds.) RESIDENT SENIOR HOUSE OFFICER (medical) required 1st February, 1958.

Applications, with copies of testimonials, should be forwarded as soon as possible to Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

MAIDENHEAD HOSPITAL, Berkshire. Applications invited for post of HOUSE SURGEON. Pre-registration post.

Applications, stating age, qualifications and nationality, with names of 3 referees, to Secretary.

MANCHESTER NORTHERN HOSPITAL. Applications are invited for the resident post of SENIOR HOUSE OFFICER in Gynæcology. Recognised for M.R.C.O.G. Vacant 14th March, 1958.

Applications, with names of 2 referees, by 13th January, 1958, to Group Secretary, North Manchester Hospital Management Committee, Crumpsall Hospital, Manchester, 8.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the resident post of REGISTRAR for the Chest Unit at Monsall Hospital, Manchester. The Unit comprises 96 tuberculous and 48 non-tuberculous beds and offers excellent experience in thoracic medicine and surgery. The appointment also includes duties at the outpatient clinic held at the Northern Hospital, Manchester.

Applications, stating age, present post, experience and names of 2 referees, to be forwarded immediately to the Secretary, Monsall Hospital, Newton Heath, Manchester, 10.

MANCHESTER, 4. ANCOATS HOSPITAL. Applications are invited for the post of REGISTRAR in General Surgery. Recognised for F.R.C.S. Vacant 21st January, 1958.

Applications, with names of 2 referees, by 13th January, 1958, to Group Secretary, North Manchester Hospital Management Committee, Crumpsall Hospital, Manchester, 8.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL EYE HOSPITAL. Applications are invited for the following posts :—

RESIDENT SURGICAL OFFICER (Registrar grade).
SENIOR HOUSE OFFICER.
HOUSE OFFICER (pre-registration surgical post).

Application forms may be obtained from the undersigned.

H. R. NORTH, General Superintendent.
Manchester Royal Eye Hospital.

MANCHESTER, 20. WITHINGTON HOSPITAL. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the pre-registration appointment of HOUSE SURGEON for a period of 6 months, falling vacant on 20th January, 1958. The hospital participates in the teaching of students in the Surgical and Obstetrical Departments and posts are recognised by the Royal Colleges. Whitley Council salaries and conditions.

Applications, stating age, qualifications, appointment(s) held and the names of 2 referees, should be sent to the Administrative Officer at the Hospital without delay.

MANCHESTER, 20. WITHINGTON HOSPITAL. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (surgical) including casualty duties. Vacant immediately. The post is recognised by the Royal College of Surgeons for the final F.R.C.S. examination, and possession of the primary F.R.C.S. will be an advantage. The Hospital is recognised by the University of Manchester for the teaching of undergraduate students.

Applications, with full details, to the Group Secretary immediately.

MANCHESTER, 23. WYTHENSHAWE HOSPITAL. SOUTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER in Plastic Surgery. Vacant 1st February, 1958. This is the only House Officer post for a Plastic Surgery Unit of 71 Beds where the candidate appointed will spend most of his time, but in addition there are some general surgical duties.

Applications, with the names of 2 referees, to the Group Secretary, Withington Hospital, Manchester, 20.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) **MID-KENT HOSPITAL MANAGEMENT COMMITTEE.** Applications are invited for the appointment of SENIOR HOUSE SURGEON in the Ophthalmic Department of the above Hospital. The Hospital is recognised by the Examining Board for the F.R.C.S. and the D.O. Salary £819 10s. a year less £150 a year for residential emoluments.

Applications should be forwarded to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Church-street, Maidstone.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) **MID-KENT HOSPITAL MANAGEMENT COMMITTEE.** Applications are invited for the appointment of SENIOR HOUSE SURGEON in the E.N.T. Department of the above Hospital. Post vacant end of January, 1958. There are 55 E.N.T. beds and 6 specialist operating sessions each week. Valuable experience is available, and the post is recognised for the purpose of the F.R.C.S. and the D.L.O. Salary will be £819 10s. a year, less £150 a year for residential emoluments.

Applications to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Maidstone, Kent.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (141 Beds.) **MID-KENT HOSPITAL MANAGEMENT COMMITTEE.** Applications are invited for the pre-registration post of HOUSE SURGEON. 6 months' appointment. Post vacant mid-January, 1958. Salary at the rate of £467 10s.–£577 10s. A deduction at the rate of £125 a year is made for board and lodging, and other services provided.

Applications should be forwarded, as soon as possible, to the Administrative Officer at the Hospital.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (141 Beds.) **MID-KENT HOSPITAL MANAGEMENT COMMITTEE.** CASUALTY OFFICER (Senior House Officer). Recognised for F.R.C.S. Salary £819 10s. p.a. less £150 p.a. for board and lodging. Post vacant February, 1958.

Applications to the Administrative Officer at the Hospital.

MURTHLY, PERTHSHIRE. THE HOSPITAL. Senior HOUSE OFFICER (psychiatry). Vacant from the end of January onwards. Term 6 or 12 months. Facilities may be afforded for postgraduate instruction in psychiatry. Good residential accommodation in the Hospital for a single person (Male or Female). Applicants may visit the Hospital by arrangement.

Applications to Group Physician-Superintendent, Murray Royal, Perth, within 14 days of publication of this advertisement.

NEWCASTLE REGIONAL HOSPITAL BOARD AND UNITED NEWCASTLE UPON TYNE HOSPITALS. PÆDIATRIC REGISTRAR, whole-time. Post designed to give wide experience in pediatrics, and circulation may include the Royal Victoria Infirmary, Princess Mary Maternity Hospital, Newcastle General Hospital, Hospital for Sick Children and Walker Gate Hospital. Successful candidate begins in the Children's Department of the Royal Victoria Infirmary.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 14 days.

NEWCASTLE REGIONAL HOSPITAL BOARD. Locum REGISTRAR ANÆSTHETIST, whole-time, for Darlington Group of hospitals for a period of 3 months from the end of January, 1958.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, immediately.

NEWCASTLE REGIONAL HOSPITAL BOARD. Regis-TRAR ANÆSTHETIST, whole-time, for Newcastle upon Tyne group of hospitals, main hospital–Newcastle General (838 Beds, including special units, i.e., neurosurgical, plastic surgery, &c.) Recognised for F.F.A.R.C.S. House available adjacent to hospital.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 14 days.

NEATH GENERAL HOSPITAL, Neath. (412 Beds.) Applications are invited for the following medical staff vacancies:

SENIOR HOUSE OFFICER (pathology).
HOUSE SURGEON.

This hospital is recognised for the major diplomas and approved by the General Medical Council for pre-registration service.

Applications, naming 2 referees, to be addressed to the Group Secretary, Mid Glamorgan Hospital Management Committee, 8, Wind-street, Neath.

NORTHAMPTON GENERAL HOSPITAL. (500 Beds.) Vacancy 1st February, 1958, for SENIOR HOUSE OFFICER, E.N.T. Department. Recognised for F.R.C.S. and for D.L.O. Appointment to 30th September, 1958, in first instance.

Applications as soon as possible to S. G. HILL, Superintendent.

NORTHAMPTON (near). CREATON HOSPITAL. (138 Beds.) Applications are invited from suitably qualified medical practitioners for the post of SENIOR HOUSE OFFICER. The Hospital has 138 Beds, and is for the treatment of both pulmonary and non-pulmonary tuberculosis. There is a major thoracic surgical unit for tuberculosis and non-tuberculous diseases of the chest.

Applications, stating age, experience and qualifications, together with the names and addresses of 2 referees, should be sent to the Secretary, Northampton and District Hospital Management Committee, General Hospital, Northampton, within 7 days of the appearance of this advertisement.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of HOUSE SURGEON for General Surgery. Recognised for the final F.R.C.S. in general surgery, and recognised as a pre-registration appointment. Vacant 1st February, 1958.

Applications, accompanied by 2 testimonials, to be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 20th January, 1958.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of HOUSE PHYSICIAN for General Medicine and Dermatology. This is recognised as a pre-registration appointment. Vacant 1st February, 1958.

Applications, accompanied by 2 testimonials, should be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 20th January, 1958.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of HOUSE SURGEON to the Gynæcological Department of 25 Beds. This appointment is recognised for the M.R.C.O.G., and may be a pre-registration appointment. Vacant 1st February, 1958.

Applications, accompanied by 2 testimonials, should be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 20th January, 1958.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for 2 posts of HOUSE PHYSICIAN to the Radiotherapy Department. These posts are recognised as pre-registration appointments. Vacant 1st February, 1958.

Applications, accompanied by 2 testimonials, should be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 20th January, 1958.

NOTTINGHAM CITY HOSPITAL. (811 Beds.) Applications are invited for the post of RESIDENT PATHOLOGIST (Senior House Officer). Previous experience an advantage. Post vacant 16th January, 1958.

Applications, stating age, nationality, qualifications and experience, together with copies of not more than 3 testimonials, to be sent to the Hospital Secretary, City Hospital, Hucknall-road, Nottingham.

NOTTINGHAM EYE HOSPITAL. (Recognised training hospital for D.O.) **SHEFFIELD REGIONAL HOSPITAL BOARD.** Whole-time REGISTRAR (Ophthalmology) required. Furnished flat available for married candidates. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 13th January, 1958, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

NOTTINGHAM EYE HOSPITAL. 2 Senior House OFFICERS required, duties to commence about the middle of January. Salary and conditions of service in accordance with Ministry regulations. There is a flat available for 1 of the successful candidates.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to the Group Secretary, General Hospital, Nottingham.

NOTTINGHAM GENERAL HOSPITAL. 2 Senior House OFFICERS (orthopædic and fracture) required (January and February, 1958). Post offers exceptional experience in traumatic surgery.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to the Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. Senior House OFFICER (anæsthetics) required about 14th January, 1958. The post is recognised for the D.A. and the F.F.A. R.C.S. This is a busy general hospital, giving experience in all branches of surgery.

Applications, stating age, nationality, qualifications and experience, together with copies of testimonials, to be sent to the Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. Senior House OFFICER (surgical) required on 25th January, 1958.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to the Group Secretary, General Hospital, Nottingham.

NOTTINGHAM GENERAL HOSPITAL. Resident pre-registration HOUSE SURGEONS required, 4th February, 5th February.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to the Group Secretary.

OXFORD REGIONAL HOSPITAL BOARD. National SPINAL INJURIES CENTRE, STOKE MANDEVILLE HOSPITAL, AYLESBURY. Applications are invited for the post of REGISTRAR at this Centre, vacant on 16th January, 1958. Experience in general surgery and medicine necessary. The post offers good experience in neurology, urology, physical medicine and rehabilitation. Full details of duties, &c., can be obtained from the Administrative Officer, Stoke Mandeville Hospital.

Applications, on forms obtainable from the Secretary, Registrar Committee, 43, Banbury-road, Oxford, should reach him by 14th January.

OXFORD REGIONAL HOSPITAL BOARD. Registrar (whole-time) in Psychiatry to Littlemore Hospital, Oxford (900 Beds). Appointment for 1 year in the first instance. Vacant 13th January. Accommodation available for single person.

Application forms, obtainable from the Secretary, Registrar Committee, 43, Banbury-road, Oxford, should reach him by 10th January.

OXFORD REGIONAL HOSPITAL BOARD. STOKE MANDEVILLE HOSPITAL, AYLESBURY. SENIOR REGISTRAR to the Plastic Surgery and Jaw Injury Service. Candidates must possess the Fellowship of one of the Royal Colleges of Surgeons and have a good background in general surgery. Previous experience in plastic surgery is not essential. The appointment in the first instance will be for one year and is renewable.

Applications, on forms obtainable from the Secretary, Joint Committee for Senior Registrars, 43, Banbury-road, Oxford, by 18th January.

OXFORD REGIONAL HOSPITAL BOARD. Registrar to the Warneford and Park Hospitals, Oxford. The Warneford Hospital (140 Beds) is an acute psychiatric unit. The Park Hospital is an associated neurosis centre (30 Beds). Full training facilities available for the D.P.M. Candidates should preferably be young graduates starting the specialist study of psychiatry. Single accommodation available.

Applications, on forms obtainable from the Secretary, Registrars Committee, 43, Banbury-road, Oxford, should reach him by 11th January.

OXFORD. THE UNITED OXFORD HOSPITALS. Applications are invited for the post of NON-RESIDENT REGISTRAR in the Nuffield Department of Surgery for 1 year in the first instance, but eligible for extension to a second year, with effect from 1st March, 1958.

Applications, on forms obtainable from the Administrator, Radcliffe Infirmary, Oxford, should be received not later than 24th January, 1958.

PLYMOUTH. SOUTH DEVON AND WEST CORN-WALL HOSPITAL, FREEDOM FIELDS. Central Casualty Department SENIOR HOUSE OFFICER in Casualty, vacancies 1st February, 1st April, 1958. Recognised for the F.R.C.S.

Applications, stating names of 3 referees, to be sent to the Group Secretary.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

(1) **Saint Mary's Hospital**

(*a*) SENIOR HOUSE OFFICER (medical). Vacant now.

(*b*) PÆDIATRIC HOUSE PHYSICIAN. Vacant 8th February, 1958.

(*c*) HOUSE SURGEON (pre-registration). Vacant 30th January, 1958, 1st February, 1958, 9th February, 1958, 11th February, 1958.

(*d*) HOUSE PHYSICIAN (pre-registration). Vacant 31st January, 1958, 12th February, 1958.

(2) **Royal Portsmouth Hospital**

(*a*) PÆDIATRIC MEDICAL HOUSE PHYSICIAN. Vacant 1st February, 1958.

(*b*) ORTHOPÆDIC SENIOR HOUSE OFFICER. Vacant now.

(*c*) HOUSE OFFICER (orthopædic) (pre-registration). Vacant now.

(3) **Queen Alexandra Hospital**

(*a*) SENIOR HOUSE OFFICER (medical and dermatology). Vacant 29th January, 1958.

(*b*) HOUSE PHYSICIAN (pre-registration). Vacant 1st February, 1958.

(*c*) HOUSE SURGEON (pre-registration). Vacant 12th February, 1958.

Applications, stating age, experience and qualifications, together with the names of 2 referees, should be forwarded as soon as possible to E. H. HURST.

St. Mary's Hospital, Milton-road, Portsmouth.

PORTSMOUTH. ST. JAMES HOSPITAL FOR MENTAL AND NERVOUS DISEASE. GROUP 49—SOUTH WEST METROPOLITAN REGION. Applications are invited for the appointment of Full-time PSYCHIATRIC REGISTRAR. The Hospital is approved as a psychiatric teaching hospital and offers excellent experience in the treatment of the neuroses, psycho-neuroses, the maladjusted child and the problem of delinquency. The Neurological Department of the Hospital is also recognised by the examining bodies and arrangements are made to enable junior medical staff to fulfil the D.P.M. Regulations regarding Mental Deficiency. Ministry of Health terms and conditions apply. Intending candidates may visit the hospital by appointment with the Physician-Superintendent.

Application forms may be obtained from the Group Secretary: 5 copies of the form, duly completed, should be returned to him within 3 weeks of the publication of this advertisement.

PAISLEY AND DISTRICT MATERNITY UNIT. House OFFICERS required for above Unit, term commencing 1st February, 1958.

Applications to Group Medical Superintendent, Royal Alexandra Infirmary, Paisley.

PAISLEY. ROYAL ALEXANDRA INFIRMARY. House SURGEONS required for General Surgical Unit, term commencing 1st February, 1958.

Applications to Group Medical Superintendent.

PAISLEY. ROYAL ALEXANDRA INFIRMARY. House SURGEON required for Orthopædic Unit, term commencing 1st February, 1958.

Applications to Group Medical Superintendent.

PRESTON (near), LANCASHIRE. WHITTINGHAM HOSPITAL. SENIOR HOUSE OFFICER. Applications are invited for this post in the largest mental hospital in the country, where all modern treatment is undertaken, including electro-encephalography for the area. Facilities will be given for study either for the D.P.M. in Manchester University or for the M.R.C.P. at a large general hospital a few miles away. This Hospital is well situated in a country district with easy access to Preston, Blackpool, and Southport. If single, there are comfortable quarters available.

Applications, endorsed "Medical Officer," giving details of experience and names and addresses of 3 referees, to be addressed to the Medical Superintendent, Whittingham Hospital, near Preston, and be received as soon as possible.

RHYL ROYAL ALEXANDRA HOSPITAL (138 Beds). Applications are invited from pre-registration or registered medical practitioners for the appointment of HOUSE PHYSICIAN. Post tenable for 6 months.

Applications, with 2 testimonials, to be sent immediately to the Group Secretary, Clwyd and Deeside Hospital Management Committee, "Rhianfa", Russell-road, Rhyl.

ROCHDALE AND DISTRICT HOSPITAL MANAGE-MENT COMMITTEE. ROCHDALE INFIRMARY. RESIDENT SENIOR HOUSE OFFICER (surgery) required. Duties include casualty and some general surgical work. Recognised for 6 months' F.R.C.S. experience.

Apply at once to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale.

ROCHESTER, KENT. ST. BARTHOLOMEW'S HOSPI-TAL, MEDWAY AND GRAVESEND HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of CASUALTY OFFICER (Senior House Officer grade) (1 of 2 in the department) which offers excellent experience with fractures and emergency surgery and presents facilities for study. Recognised for F.R.C.S. Post vacant now and tenable for 6 months or 1 year. Salary £819 10s. p.a.

Applications, stating age, nationality, qualifications and experience, with recent testimonials, to Hospital Secretary.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) SENIOR HOUSE OFFICER (resident or non-resident) required for duties in the Casualty Department. Available for Male or Female applicants. This is a large general hospital with specialised departments dealing with all types of acute medical and surgical cases. The post affords good opportunity for gaining tuition and experience.

Applications should be forwarded immediately to the Group Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. SENIOR HOUSE OFFICER (Male or Female) required from 5th February, 1958. Duties include work in general medicine and in the regional poliomyelitis unit (30 Beds) where excellent experience of modern methods can be obtained. Resident post.

Applications to the Medical Superintendent.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (301 Beds.) RESIDENT HOUSE PHYSICIAN (Male or Female) required from 7th February, 1958. This Hospital provides for acute medical, surgical and infectious patients. The post, which is also open to pre-registration candidates, offers good opportunities for gaining experience in both general medicine and fevers.

Applications should be addressed immediately to the Medical Superintendent, stating also names of 2 referees.

RYDE. ROYAL I.W. COUNTY HOSPITAL. Isle of Wight GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER for pre-registration service (salary £467 10s.–£577 10s., according to experience) or SENIOR HOUSE OFFICER (salary £819 10s.) required as House Surgeon. Post recognised for F.R.C.S.

Applications, with names of 2 referees, to the Hospital Secretary not later than 17th January.

SALISBURY GENERAL HOSPITAL. Applications are invited for the appointment of RESIDENT HOUSE SURGEON/HOUSE PHYSICIAN to run consecutively in this order for a period of 6 months in each post. The post is open to pre-registration candidates.

Apply, naming 2 referees, to Group Secretary, Salisbury Group Hospital Management Committee, Odstock Hospital, Salisbury.

SALISBURY GENERAL HOSPITAL. Applications are invited for the appointment of RESIDENT OBSTETRIC AND GYNÆCOLOGICAL HOUSE SURGEON (recognised by R.C.O.G.)/HOUSE SURGEON for a period of 6 months in each post commencing with House Surgeon post. The posts are open to pre-registration candidates.

Apply, giving names and addresses of 2 referees, to Group Secretary, Salisbury Group Hospital Management Committee, Odstock Hospital, Salisbury.

SALFORD ROYAL HOSPITAL. Salford Hospital Manage-MENT COMMITTEE. The following pre-registration House Officer posts will fall vacant in January, 1958:

HOUSE SURGEON (urology)

HOUSE SURGEON (casualty).

Applications, stating age and qualifications, together with copies of 2 recent testimonials, should be addressed to the Secretary, Salford Royal Hospital, Chapel-street, Salford, 3.

SALFORD 6. HOPE HOSPITAL. Salford Hospital MANAGEMENT COMMITTEE. Applications are invited for the post of PÆDIATRIC HOUSE OFFICER (post registration) which becomes vacant on the 16th February, 1958. The post is recognised for the D.C.H.

Applications, stating age, qualifications and experience, together with the names and addresses of 2 referees, should be forwarded to the Hospital Secretary forthwith.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. Tuberculosis—Perth Area. Applications are invited for the post of REGISTRAR in Tuberculosis and Industrial Chest Diseases for work in tuberculosis in the Perth Area and a new diagnostic unit for industrial chest diseases at Bridge of Earn (General) Hospital (806 Beds). Salary and conditions of service in accordance with national agreement.

Further particulars and forms of application from the Secretary to the Board, 430, Blackness-road, Dundee, with whom applications must be lodged by 18th January, 1958.

SCOTLAND. NORTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the post of SENIOR REGISTRAR in General Surgery on the staff of the Aberdeen General Hospitals.

Applications, together with the names of 2 referees, should be forwarded by 15th January, 1958, to the Senior Administrative Medical Officer, 1, Albyn-place, Aberdeen, from whom further particulars and a form of application may be obtained.

SCOTLAND. NORTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the post of SENIOR REGISTRAR in Radiotherapy on the staff of the Aberdeen General Hospitals.

Applications, together with the names of 2 referees, should be forwarded by 15th January, 1958, to the Senior Administrative Medical Officer, 1, Albyn-place, Aberdeen, from whom further particulars and a form of application may be obtained.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in Surgery to the Edinburgh Northern Group of hospitals.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 25th January, 1958.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in Orthopædic Surgery to the West Fife Group of hospitals, based on the Dunfermline and and West Fife Hospital.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 18th January, 1958.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in Medical Pædiatrics to the Edinburgh Northern Group of hospitals. The duties of the post will be in the Western General Hospital, Leith Hospital and the newborn nurseries in the Eastern General Hospital, and the successful candidate will be required to assist in undergraduate teaching.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 18th January.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments, which will be for 1 year in the first instance:

SENIOR REGISTRAR in Medicine based at Hairmyres Hospital, East Kilbride.

SENIOR REGISTRAR in Ophthalmology based at the Ophthalmic Institution, Glasgow.

SENIOR REGISTRAR in Ophthalmology based at the Eye Infirmary, Glasgow.

REGISTRAR in Medicine based at Larkfield Hospital, Greenock.

REGISTRAR in Pædiatrics based at Seafield Children's Hospital, Ayr, and with duties at the Ayrshire Maternity Hospital.

REGISTRAR in Psychiatry based at Woodilee Mental Hospital, Lenzie, near Glasgow. A small flat will be available.

REGISTRAR in Surgery based at Stobhill General Hospital, Glasgow, with duties on a rotational basis at Falkirk and District Royal Infirmary.

Applications (12 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, by 18th January, 1958.

SCUNTHORPE AND DISTRICT WAR MEMORIAL HOSPITAL (267 Beds). Recognised for training for F.R.C.S. SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (Orthopædics) required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 13th January, 1958, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS, ROYAL INFIRMARY/ROYAL HOSPITAL UNITS. Applications invited for the non-resident post of REGISTRAR to the Department of Radiology at the above Hospitals.

Applications, stating age, qualifications, and experience, with the names of 3 referees, should be sent at once to the Chief Administrative Officer, The United Sheffield Hospitals, West-street, Sheffield, 1.

SHREWSBURY. EYE, EAR AND THROAT HOSPITAL. SENIOR HOUSE OFFICER (ophthalmic). Eye Unit, 35 Beds. Post recognised for the D.O.M.S. Vacant 9th February, 1958.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SHREWSBURY. ROYAL SALOP INFIRMARY/COPTHORNE HOSPITAL. (500 Beds.) HOUSE PHYSICIAN—pre-registration candidates eligible. Vacant 31st January, 1958.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SOUTHAMPTON GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics) for the Anæsthetic Department of the Southampton Group of hospitals. Special facilities for working for F.F.A. R.C.S. and D.A.

Applications, with copies of testimonials, should be forwarded as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON GENERAL HOSPITAL. South West METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of Whole-time SURGICAL REGISTRAR to the above Hospital, vacant mid March. Post will normally be tenable for 2 years, but subject to review at the end of the first year. Candidates may visit the Hospital, by arrangement, if they so desire.

Forms of application may be obtained from the undersigned, to whom they should be returned not later than 15th January, 1958. FRANK JENNINGS, Group Secretary,

Southampton Group Hospital Management Committee.
Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (274 Beds.) Recognised for F.R.C.S. CASUALTY OFFICER (Senior House Officer grading) required.

Applications, with copies of testimonials, to be submitted as soon as possible to the Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (274 Beds. Recognised for F.R.C.S.) ORTHOPÆDIC HOUSE SURGEON (post recognised for pre-registration service and tenable for 6 months). The Hospital is the centre to which all trauma from a large industrial town and port is directed, thus providing excellent experience in the treatment of traumatic conditions; patients with orthopædic conditions are drawn from a wide area.

Applications, with copies of testimonials, should be sent as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL (274 Beds) and SOUTHAMPTON GENERAL HOSPITAL (469 Beds). SENIOR HOUSE OFFICER (E.N.T.) required in February. This post is recognised for the F.R.C.S. (Eng.) and D.L.O. examinations and provides experience in all branches of E.N.T. work. The Group includes a diagnostic and distributing hearing-aid centre.

Applications, with copies of recent testimonials, should be forwarded as soon as possible to the Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. Locum SENIOR SURGICAL REGISTRAR required 3rd–16th February.

Application, with names of 2 referees, to Secretary.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Whole-time REGISTRAR in Obstetrics and Gynæcology to fill a vacancy in the approved trainee establishment at the Brighton and Lewes Groups of hospitals. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staff (England and Wales) and will be for 1 year in the first instance.

Applications, giving particulars of age, qualifications and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, 11, Portland-place, W.1, not later than 18th January, 1958.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as Whole-time REGISTRAR in General Surgery to fill a vacancy in the approved trainee establishment in the Medway and Gravesend Group of hospitals. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staff (England and Wales), and will be for 1 year in the first instance.

Applications, giving particulars of age, qualifications and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 18th January, 1958.

SOUTH EAST NORTHUMBERLAND HOSPITAL MANAGEMENT COMMITTEE. JUNIOR ANÆSTHETIST. Junior Hospital Medical Officer or Senior House Officer, grade according to experience. Post recognised under Fellowship and Diploma regulations.

Applications, with names of 2 referees, to Group Secretary, Preston Hospital, North Shields.

SOUTHEND GENERAL HOSPITAL. Locum Tenens HOUSE PHYSICIAN required (pre-registration or fully registered) from 13th to 26th January, 1958 (inclusive).

Applications to undersigned as soon as possible.

J. C. FIELD, Secretary.

ST. HELENS AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. ECCLESTON HALL HOSPITAL (75 Beds). DELPH LANE HOSPITAL, WHISTON (34 Beds). Applications are invited from fully or provisionally registered practitioners for the appointment of HOUSE PHYSICIAN to Eccleston Hall and Delph Lane Hospitals. The appointment may be made in the grade of Senior House Officer, dependent on the qualification and experience of the applicant. The appointment is approved as a pre-registration service post. The person appointed will work under the supervision of the Consultant Chest Physician for the Group. The work comprises all types of tuberculosis and includes chest clinic work. Good residential accommodation for a single person, Male or Female, is available. The post may be non-resident, subject to residence within reasonable distance from the Hospitals.

Applications to be forwarded to: N. RICHARDS, Group Secretary, Whiston Hospital, Prescot.

ST. HELENS HOSPITAL (196 Beds.) Applications are invited for the post of RESIDENT HOUSE SURGEON, vacant from 1st March, 1958, which is recognised for pre-registration service and for the F.R.C.S. examinations. The appointment will be made in the Senior House Officer grade in the case of a candidate who has already held 2 pre-registration posts.

Applications, stating age, date of qualification and experience, and giving 2 names for reference, should be forwarded to N. RICHARDS, Group Secretary, St. Helens and District Hospital Management Committee, Whiston Hospital, Prescot, Lancs, immediately.

ST. ALBANS CITY HOSPITAL, St. Albans, Hertfordshire. (384 Beds.) HOUSE SURGEON (House Officer grade) required immediately for 1 of the 2 surgical teams. Post recognised for F.R.C.S. Preference given to candidates seeking post under the Medical Act, 1950.

Applications to Secretary, Mid Herts Group Hospital Management Committee, Bleak House, Catherine-street, St. Albans.

ST. ASAPH GENERAL HOSPITAL, Flintshire. (54 obstetric beds.) Applications are invited from pre-registration or registered medical practitioners for the post of JUNIOR HOUSE OFFICER. Recognised for the D.Obst.R.C.O.G. Post vacant 1st February, 1958. Tenable for 6 months. Married quarters available.

Applications, together with 2 testimonials, to be sent immediately to: Group Secretary, Clwyd and Deeside Hospital Management Committee, "Rhianfa", Russell-road, Rhyl.

STOCKPORT INFIRMARY. Applications are invited for the post of SENIOR HOUSE OFFICER (Resident Surgical Officer), vacant early February, 1958. The post is recognised for the F.R.C.S.

Applications, stating age, experience and qualifications, together with copies of 2 testimonials, to be addressed to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw Heath, Stockport.

STOCKPORT INFIRMARY. (163 Beds.) Applications are invited for the pre-registration post of HOUSE OFFICER (general surgery), vacant 31st January, 1958. This post is recognised for the F.R.C.S. and D.L.O.

Applications, with full particulars and copies of 2 testimonials, to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw Heath, Stockport.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. HOUSE PHYSICIAN required. Pre-registration post vacant January.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. HOUSE OFFICER (general surgery) required. Recognised for F.R.C.S. 2 posts vacant January.

Detailed applications, with copy testimonials, to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

SWINDON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications invited for post of GYNÆCOLOGICAL HOUSE SURGEON at St. Margaret's Hospital, vacant 18th January, 1958. To be followed by an appointment as Obstetrics House Surgeon at Swindon Maternity Hospital. Posts offer excellent experience and obstetrics appointment recognised for D.Obst.R.C.O.G.

Applications to Secretary, 7, Okus-road, Swindon, as soon as possible.

SWINDON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for post of RESIDENT HOUSE PHYSICIAN in acute medical unit of 64 Beds at St. Margaret's Hospital. Recognised for training under pre-registration internship regulations and vacant on 31st December, 1957.

Full details, with names of 3 referees, to Secretary, 7, Okus-road, Swindon, immediately.

TAUNTON AND SOMERSET HOSPITAL. Applications are invited for the post of HOUSE OFFICER (E.N.T.). Post-registration appointment, recognised for F.R.C.S. and D.L.O.

Applications, stating age, nationality and qualifications together with the names of 2 referees, should be forwarded to the Group Secretary, Taunton Hospital Management Committee, Taunton and Somerset Hospital, Musgrove Park Branch, Taunton, Somerset.

TORQUAY. TORBAY HOSPITAL. (166 general beds.) RESIDENT HOUSE OFFICER (surgical), Male or Female, required immediately. Post recognised for F.R.C.S. and pre-registration purposes. There is a complement of 6 Resident House Officers.

Applications, stating qualifications, nationality and age, together with copy testimonials (quoting reference F.955/84), to the Group Secretary, Torquay District Hospital Management Committee, Torbay Hospital, Torquay, S. Devon.

TYNEMOUTH VICTORIA JUBILEE INFIRMARY. (115 Beds.) RESIDENT HOUSE SURGEON (orthopædic), Junior Hospital Medical Officer or Senior House Officer grade according to experience. Post is also recognised for pre-registration purposes.

Applications, with names of 2 referees, to Group Secretary, Preston Hospital, North Shields.

WELSH REGIONAL HOSPITAL BOARD

REGISTRAR in General Medicine to serve West Wales Hospital Management Committee. Based Pembroke County War Memorial Hospital, Haverfordwest (163 Beds). Might be expected to serve other hospitals in group. Resident/non-resident.

REGISTRAR in General Surgery, Pembroke County War Memorial Hospital, Haverfordwest. Resident or non-resident.

Subject to review annually.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WELSH REGIONAL HOSPITAL BOARD.

REGISTRAR in Psychiatry, North Wales Hospital for Nervous and Mental Disorders, Denbigh. Hospital provides comprehensive mental health service for North Wales, outpatient clinics at major general hospitals and associated child guidance services. Every modern therapy and department of psychology and electroencephalography. Modern open-door reception units; annual admission-rate over 1000. House available for married man and family.

SENIOR REGISTRAR in Obstetrics and Gynæcology to the above-mentioned Board. Based in Cardiff Hospital Management Committee hospitals with duties also in United Cardiff Hospitals. Non-resident.

2 REGISTRARS (general surgery), Llanelly. Resident.

Subject to review annually.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WARRINGTON INFIRMARY. (172 Beds.) Applications are invited for the post of RESIDENT ANÆSTHETIST (Male or Female), graded as Senior House Officer. The Hospital is recognised for the D.A. examination. Salary is £819 10s. p.a. less a deduction of £150 p.a. for residential emoluments.

Applications, stating qualifications and experience, should be sent to— HENRY L. BOOT, Group Secretary,
Warrington and District Hospital Management Committee.
c/o General Hospital, Warrington, Lancs.

WATFORD CHEST CLINIC, Peace Memorial Hospital, WATFORD. Locum REGISTRAR required immediately for work at the above Chest Clinic and beds (tuberculosis and chest medicine) at associated hospitals. Car is desirable and allowances are paid.

Apply immediately to the Physician in charge. (Telephone: Watford 9266.)

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL HOSPITAL. (211 Beds.) ORTHOPÆDIC HOUSE SURGEON (with certain casualty duties) required. Post recognised for F.R.C.S.(Eng.) examination. Intermediate or senior post, depending on experience, for orthopædic unit (30 Beds). The orthopædic service is in the charge of a Consultant and Registrar closely associated with a postgraduate teaching hospital.

Applications with copies of 2 testimonials to the Administrator.

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL HOSPITAL. (211 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital. This is a pre-registration post and is recognised for F.R.C.S. Salary according to the National Health Service scale.

Applications, with copies of recent testimonials, to the Administrator.

WEST CUMBERLAND HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER in Anæsthetics required for work throughout the West Cumberland Group but based on Whitehaven Hospital. Good experience essential, and possession of the D.A. preferred.

Apply, with full information as to qualifications and experience, and giving the names of 2 referees, to the Group Secretary at Workington Infirmary.

WESTON-SUPER-MARE GENERAL HOSPITAL. (107 Beds.) Applications are invited from registered medical practitioners for the pre-registration appointment (resident) of HOUSE PHYSICIAN, vacant 1st February, 1958.

Applications, stating age, qualifications, together with names and addresses of 2 referees, should be addressed to the Secretary, Weston-super-Mare Hospital Management Committee.

WESTON-SUPER-MARE GENERAL HOSPITAL. (107 Beds.) Applications are invited from registered medical practitioners for the pre-registration appointment (resident) of HOUSE SURGEON, vacant 1st February, 1958.

Applications, stating age, qualifications, together with names and addresses of 2 referees, should be addressed to the Secretary, Weston-super-Mare Hospital Management Committee.

WOLVERHAMPTON. THE ROYAL HOSPITAL. (Associated Hospital of Birmingham University Medical School.) REGISTRAR in Diagnostic Radiology. Part I Diploma of Medical Radiology essential. Hospital recognised for Part II. Duties also at other Hospitals in the Group.

Application forms from Group Secretary, The Royal Hospital, Wolverhampton, to be returned by 13th January, 1958.

WREXHAM. MAELOR GENERAL HOSPITAL. (591 Beds.) Applications are invited for the posts of HOUSE SURGEON (2) at the above Hospital, to commence duties on 1st February, 1958. The appointments are recognised for the diploma of F.R.C.S. (England, Edinburgh, and Ireland) and are pre-registration posts.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WREXHAM (near). TREVALYN MANOR MATERNITY HOSPITAL, ROSSETT, near WREXHAM. (47 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital, to commence duties on 1st February, 1958. The Hospital is a Part II midwifery training school and deals with normal and abnormal midwifery.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WREXHAM. WAR MEMORIAL HOSPITAL. (230 Beds.) Applications are invited for the posts of HOUSE SURGEON (2) at the above Hospital, to commence duties on 1st February, 1958. The appointments are recognised for the Diploma of F.R.C.S. (England and Edinburgh) and are pre-registration posts.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WORCESTER ROYAL INFIRMARY. House Surgeon (pre-registration or otherwise) required mid-January for general surgery post at this busy general hospital of 213 Beds. The appointment offers wide and varied experience and is recognised for the F.R.C.S. examinations.

Applications to Hospital Secretary.

WORCESTER ROYAL INFIRMARY. House Surgeon (pre-registration or otherwise) required mid-January for Orthopædic Department of this busy general hospital of 213 Beds. The appointment offers wide and varied experience.

Applications to Hospital Secretary.

WORCESTER ROYAL INFIRMARY. (213 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER in Medicine (Resident Medical Officer), vacant early January. The post is of 1 year's duration and although dealing mainly with acute medicine the post also covers some work in infectious diseases and geriatrics.

Applications, with copies of 3 recent testimonials, to be sent to the Secretary.

WORKINGTON INFIRMARY, Cumberland. (155 Beds, pre-registration post, recognised F.R.C.S. Edin.). HOUSE SURGEON (first, second or Senior House Officer post). Vacant mid-January.

Detailed applications with dates and names of 2 referees to Secretary.

WORKSOP, KILTON HOSPITAL. (185 Beds). Sheffield REGIONAL HOSPITAL BOARD. Whole-time RESIDENT MEDICAL REGISTRAR required 18th February. Married accommodation available. Appointment for 1 year in the first instance. The Kilton hospital contains the medical division of the Worksop Group, which includes 42 acute medical beds, some 67 geriatric, 15 paediatric and 4 dermatological beds. There are 2 House Physicians on the establishment.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 13th January, 1958, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

DUBLIN. ST. VINCENT'S HOSPITAL. A vacancy for the position of SURGICAL REGISTRAR will be filled in the near future.

For further particulars please apply to the undersigned. Latest date for application 15th January, 1958.

OLIVER FITZGERALD, Honorary Secretary, Medical Board.

B.W.I. UNIVERSITY COLLEGE HOSPITAL OF THE WEST INDIES. Applications are invited for the post of REGISTRAR or SENIOR REGISTRAR in Paediatrics at the above-named Teaching Hospital. The successful candidate will be required to commence duties on or about 1st February, 1958. The appointment is for 1 year in the first instance, and the salary will be within the scale £900–£100–£1000 : £1200–£100–£1500 p.a. depending on previous experience and qualifications. Unfurnished accommodation will be provided at a rental of 5% of salary. Return passages from and to the country of recruitment will be provided for the successful candidate only.

Further information may be obtained from the Hospital Manager and Secretary, University College Hospital of the West Indies, Mona P.O., Jamaica, B.W.I., to whom applications, stating age, nationality, qualifications and experience, together with the names and addresses of 3 referees, should be sent not later than 18th January, 1958.

CANADA. GRACE HOSPITAL, Winnipeg, Manitoba, CANADA, has vacancies for RESIDENCIES and SENIOR INTERNSHIPS. Salary £200 per month plus maintenance. Uniforms and laundry provided. Grace Hospital is an active general hospital of 230 Beds with approximately 9128 discharges per year. Consideration may be given towards financial assistance with passage.

Applicants with credentials are invited.

IBADAN, NIGERIA. UNIVERSITY COLLEGE HOS-PITAL. The Board of Management invite applications from medical practitioners with the necessary experience as REGISTRARS (Department of Medicine) in the newly completed teaching hospital. The hospital is provisionally recognised by the University of London for the purpose of teaching undergraduates to the standard of the M.B., B.S. (London) degree (in special relationship). Undergraduate teaching began in October, 1957.

The salary offered for the posts is £1164 p.a. plus an inducement allowance for expatriate officers of £270 p.a. The appointments will be initially for 1 tour of 12 months and will be renewable by mutual agreement for a further tour of 12 months at a salary of £1212 p.a.

On satisfactory completion of the agreement, a gratuity of £37 10s. will be paid for each completed period of 3 months' service. An outfit allowance of £60 is payable on first appointment.

Partly furnished quarters are provided at a rental of 3½% of salary, excluding inducement allowance, and an expatriate officer appointed will be eligible for 7 days' leave on full pay for each completed month of service in Nigeria. A Nigerian Registrar will be entitled to either 5 or 7 days' leave for each completed month of service.

Free first-class passages are provided for expatriate doctors and their wives on first appointment and on completion of the agreement. Free first-class passages to Nigeria will, in certain circumstances, be provided for non-expatriate doctors. Free first-class passages will be provided for vacation leave.

Candidates will be eligible for children's allowances in accordance with existing regulations.

Arrangements can be made to enable doctors to continue their N.H.S. superannuation scheme contributions, and details of the revised salary and gratuity payable in such cases will accompany application forms.

Applications should be submitted not later than 18th January, 1958, on the appropriate forms, which will be forwarded, together with additional information, on receipt of an addressed foolscap envelope by the Adviser on Staff Recruitment, London Office, (University College Hospital, Ibadan), 57, Catherine-place, Palace-street, London, S.W.1.

MICHIGAN, U.S.A. OAKWOOD HOSPITAL, Dearborn, MICHIGAN. Applications are invited for 1 or 2-year approved GENERAL PRACTICE RESIDENCY in modern 234-Bed General Hospital 10 miles from Detroit. Excellent facilities. Hospital approved for exchange-visitor programme. Beginning monthly salary $250 if single, $300 if married. Free housing.

Apply: Director.

OTTAWA CIVIC HOSPITAL, Ottawa, Canada (General— 800 Beds), invites applications to fill an appointment as RESIDENT in Medical Department from 1st July, 1958, to 30th June, 1959. This is a senior appointment for a man who proposes to write Fellowship examinations in Canada in the field of internal medicine and the appointment involves teaching graduate interns. Salary $200 per month, plus room and board.

Applications, stating age, qualifications, experience, and names of 2 referees, should be forwarded to Superintendent, Ottawa Civic Hospital, Ottawa, Canada.

U.S.A. ST. ELIZABETH HOSPITAL, Covington, Ken-TUCKY. (400-Bed Hospital.) Required, INTERNES. Internship approved by the American Medical Association. Rotate through services in surgery, medicine, pediatrics, obstetrics and emergency room. Starts 1st July, 1958 and ends 30th June, 1959. Salary $200 per month with maintenance.

Contact Hospital.

Public Appointments

BUCKS COUNTY COUNCIL. Applications are invited from registered medical practitioners for the appointment of ASSISTANT COUNTY MEDICAL OFFICER in the Aylesbury area. Preference will be given to applicants possessing a Diploma in Public Health or a Diploma in Child Health, and experience in maternity, school medical and child welfare work. Salary within the scale £1050–£1475 p.a., the commencing salary being fixed according to qualifications and experience. Travelling and subsistence allowances on the County Council's scale will be paid. The appointment is superannuable and subject to medical examination.

Further particulars and forms of application may be obtained from the County Medical Officer, County Offices, Aylesbury, to whom completed applications must be returned by 20th January, 1958. R. E. MILLARD, Clerk of the Bucks County Council.

County Hall, Aylesbury, December, 1957.

FACTORY DOCTORS. Factories Acts, 1937 and 1948. The following appointment as Appointed Factory Doctor is vacant. Apply to Chief Inspector of Factories, 19, St. James's-square, London, S.W.1.

District	*County*	*Latest date for receipt of applications*
SOUTHWOLD ..	SUFFOLK	18TH JANUARY, 1958

NOTTINGHAMSHIRE COUNTY COUNCIL. Public HEALTH DEPARTMENT. Applications invited from registered medical practitioners (either sex) for temporary whole-time or part-time appointments of approximately 6 months' duration. Duties will primarily be connected with vaccination and immunisation, but other work, including school health and child welfare, may also be undertaken. Salary £1050 p.a. or, if holding a Diploma in Public Health, £1200 (pro rata for part-time appointments).

Application forms obtainable from the County Medical Officer, County Hall, West Bridgford, Nottingham.

A. R. DAVIS, Clerk of the County Council.

TREASURY MEDICAL SERVICE. Applications are invited from medical practitioners, practising in the districts detailed below, for appointment, in a part-time and mainly advisory capacity, as LOCAL TREASURY MEDICAL OFFICER for each of the places or groups of places shown. The town shown in parentheses after the place-names indicates the Head Post Office Area in which the place, or group of places, is situated. Successful applicants will be required to examine and report on the condition of certain Government Officers, teachers, candidates for appointment, &c., who may be referred to them from time to time; and to attend when summoned to an emergency case of accident or sudden illness occurring in a Government office in the neighbourhood. Fees for this work, and mileage allowance where necessary, will be paid on a scale agreed with the British Medical Association.

Intending applicants should write, within 14 days, to: Treasury Medical Adviser, Treasury Chambers, Whitehall, S.W.1, for a form on which application may be made. Applicants should be not more than 60 years of age.

The places for which applications are invited are as follows:—

England and Wales

Leeds, South East (Leeds).
Ashleworth (Gloucester).
Pitsea, Wickford and Battlesbridge (Basildon).
Woodlands, Adwick-le-Street, Carcroft and Barmburgh (Doncaster).
Kingston-on-Thames (Kingston-on-Thames).
Rayleigh and Hockley (Southend-on-Sea).

THE MEDICAL SERVICE OF THE ROYAL NAVY

VACANCIES FOR MEDICAL OFFICERS

Candidates are invited for Short Service Commissions of 3 years, on termination of which a gratuity of £600 (tax free) is payable. Ample opportunity is granted for transfer to Permanent Commissions on completion of 1 year's total service. Officers so transferred are paid instead a grant of £1500 (taxable).

All entrants are required to be British subjects whose parents are British subjects, medically qualified, physically fit, and to pass an interview.

Full particulars from the Admiralty Medical Department, Queen Anne's Mansions, St. James's Park, London, S.W.1.

DERBYSHIRE COUNTY COUNCIL. County Health DEPARTMENT. MATERNAL AND CHILD WELFARE MEDICAL OFFICER (Female). Applications are invited from fully qualified medical practitioners for this whole-time superannuable post. Candidates should be experienced in antenatal work, midwifery, and children's diseases, as they will be required to hold consultations at the Council's maternity and child welfare clinics and centres, and to perform such other duties as may be required. Salary £1050–£50–£1200–£55–£1475 p.a., plus a car allowance.

Particulars and application forms are obtainable from Dr. J. B. S. MORGAN, County Medical Officer, St. Mary's-gate, Derby, and should be returned to him duly completed not later than 6th January, 1958.

DUMFRIES COUNTY COUNCIL. Assistant Medical OFFICER. Applications are invited from registered medical practitioners (Male) preferably possessing a diploma in public health for appointment as an ASSISTANT TO THE MEDICAL OFFICER OF HEALTH AND SCHOOL MEDICAL OFFICER for the County of Dumfries. Applicants with experience of school medical service duties will receive special consideration. Salary on Whitley Council scale (£1050–£1475 p.a.).

Particulars and forms of application may be obtained from the undersigned with whom applications should be lodged by 13th January, 1958. LESLIE T. CARNEGIE, County Clerk.

County Buildings, Dumfries, 18th December, 1957.

SLOUGH INDUSTRIAL HEALTH SERVICE. Applications are invited for the post of ASSISTANT MEDICAL OFFICER with effect from 1st April, 1958. Duties entail supervision of the emergency casualty service and the normal duties of an industrial medical officer. Casualty experience is essential and experience in industry and/or general practice an advantage. Commencing salary £1400 p.a. with car allowance of £150 p.a. The post is superannuated. A small partly furnished cottage with garage can be rented.

Applications should be submitted at once to the Medical Director, Slough Industrial Health Service, Central Clinic, Farnham-road, Slough, Bucks, with the names of 3 referees.

YORKSHIRE. COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE. Appointment of ASSISTANT COUNTY MEDICAL OFFICER AND SCHOOL MEDICAL OFFICER. Applications are invited from registered medical practitioners, Men or Women, for posts in the following areas :—

Division No. 17. Spenborough M.B., and Mirfield Urban District.

Division No. 20. Kirkburton, Denby Dale, Colne Valley, Meltham, Holmfirth, and Saddleworth Urban Districts.

The Assistant will be on the staff of the County Medical Officer's Department but will work under the administrative direction of the Divisional Medical Officer for the area. The duties will be mainly clinical in the School Health and Infant Welfare Services, but other County health duties may be included by the Divisional Medical Officer. The scale of salary is £1050–£1475 p.a. A minimum of 3 years' experience since qualification is desirable and the possession of a Diploma in Child Health will be an advantage. Travelling and subsistence allowances according to the County Council's scale are payable in addition to salary. The posts are superannuable and successful applicants will be required to pass a medical examination as to physical fitness.

Forms of application can be obtained from the undersigned, to whom they should be returned not later than 13th January, 1958.

J. WOOD-WILSON, County Medical Officer.

County Hall, Wakefield.

HER MAJESTY'S OVERSEAS CIVIL SERVICE. Medical OFFICERS required in Sarawak for general medical duties. Candidates must possess medical qualifications registrable in United Kingdom. Appointment on permanent basis with pension (non-contributory) or on short-term contract with gratuity (taxable) of 12½ % of salary including inducement pay, for each completed period of 1 month, payable on completion of satisfactory service. Candidates from the National Health Service may retain superannuation rights (up to 6 years) and receive gratuity (taxable) of 20 % of aggregate salary at the end of their engagement. Only permanent officers become members of Her Majesty's Overseas Civil Service. Basic salary scale £1218–£1988 a year, starting salary determined according to qualifications and experience. In addition inducement pay (pensionable) is payable varying from £252 to £336 a year, education allowance of £140 a year for up to 2 children between ages of 15 and 17 educated in country of domicile and a child allowance of 7½ % of basic salary (maximum £140 a year) for married officers with dependent children under age 18. Partially furnished quarters provided, at low rental. Free passages provided in both directions for officer, wife, and up to 3 children, under 18 years of age. Low taxation. Local leave permitted and generous home leave granted.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting reference BCD. 117/24/01).

GOVERNMENT OF THE EASTERN REGION OF NIGERIA. SPECIALIST (Pathologist) required to organise and run a Regional Laboratory Service, take charge of a Regional Laboratory when built, and administer subsidiary laboratory units attached to Government hospitals in the Region. A higher qualification is desirable. Appointment on contract for 2 tours of not more than 2 years each. Salary £2442 a year, and gratuity (taxable), payable on completion of satisfactory engagement, of £37 10s. for each completed period of 3 months' service (including leave). Quarters provided at rental of 10 % of salary. Taxes at local rates. Annual local leave permissible; generous home leave after each tour. Free return passages for officer and wife; and, when appropriate, either (but not both) of the following in any 1 tour of service:—

(*a*) 1 return sea passage for each of 2 children under age 18 subject to maximum of £75 for the return journey for each child, or

(*b*) An allowance of £75 a year for each of 2 children under age 18 maintained outside Nigeria for the whole tour.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting BCD. 117/411/019).

GOVERNMENT OF JAMAICA. Medical Officers with qualifications registrable in United Kingdom required as follows:

(*a*) Doctors who have completed 1 year's house appointment to assist Medical Officer in charge of district hospital or a Specialist at Kingston Public Hospital (540 Beds) in general surgery and medicine, pædiatrics, ear, nose and throat, eye, casualty (rotation service) "R" practitioners, i.e., practitioners liable for call-up under the National Service Acts may apply and, if appointed, will be granted indefinite deferment of call-up on completion of minimum tour of 2 years.

(*b*) Doctors with 3 or 4 years' approved experience following graduation for duties as above but with more responsibility. May also be assigned for duty in psychiatry at Bellevue (Mental) Hospital (3000 Beds).

(*c*) Doctors between 45 and 50 years of age with more than 4 years' approved experience for general duty at Kingston Public Hospital or as Medical Officer in districts to hold regular clinics and have medico-legal responsibilities and perform post-mortems.

Appointments on contract for 3 years in first instance with possibility of eventual pensionable employment. Salary scale £900–£1600 a year. Starting salary depends on experience. On satisfactory completion of service a gratuity (taxable) of 20 % of salary is payable for each completed 3 months' service. (Not payable if officer is placed on pensionable establishment.) Free passages for officer, wife and dependent children under 18 years, not exceeding 5 persons in all. Quarters not provided but subsidy payable where rents exceed 10 % of salary. Income-tax at local rates. Climate healthy, educational facilities available.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1 (quoting BCD. 117/32/023).

Hospital Services: Non-Medical Appointments

DONCASTER HOSPITAL MANAGEMENT COM-MITTEE. Applications are invited from suitably qualified persons for the post of BIOCHEMIST (basic grade) at Doncaster Royal Infirmary. Candidates should possess a Science Degree.

Applications, stating age, education, qualifications, experience and present position, together with the names of three referees, should be forwarded to reach the undersigned not later than 18th January, 1958. A. JONES, Group Secretary.

Doncaster Royal Infirmary.

Miscellaneous

The World Health Organization, Geneva, has a vacancy for an Assistant Medical Editor of its technical publications. Responsibilities include participation in selection of material for publication in book form or in one of the technical periodicals of W.H.O., supervision of editorial staff, and assistance in the management and administration of a programme of publications. Applications will be considered only from candidates of English mother-tongue with a medical degree and several years' full-time experience of medical or scientific editing. Short-listed candidates may be required to take a test of writing and editing ability. Initial 2-year contract with 1 year probationary period. Starting salary: US$6000 (tax free) plus allowances according to staff rules.

Detailed curriculum vitæ should be sent to: Personnel Section, World Health Organization, Palais des Nations, Geneva, Switzerland. Candidates who do not receive a reply by 15th February may consider that their application is unsuccessful. Closing date 18th January, 1958.

Korea. Doctor (Female) required with pædiatric experience; age preferably between 26 and 40. Contract 1 year renewable. Salary £1000 p.a. Maintenance equipment allowances and fares paid. 1 month's holiday per year. Duties in Pusan, Korea.—Apply Foreign Relief Secretary, Save the Children Fund, 12, Upper Belgrave-street, S.W.1. Telephone SLOane 9171.

Doctor required in N.W. area willing to be "on call" on Saturdays. No surgery.—Address No. 358, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

MEDICAL OFFICER

required by large oil company for service initially based on London but entailing overseas tours of duty and eventually for permanent service in the Middle East. Preference will be given to bachelors under 37 with overseas experience and some knowledge of tropical work. Salary in accordance with the B.M.A. salary scale. Pension scheme.—Apply, quoting No. 646, to Box No. 1374, c/o CHARLES BARKER AND SONS LTD., Gateway House, London, E.C.4.

Doctors requiring applications, theses copied: Write to MANTON (WESTMINSTER) LTD., 98, Victoria-street, S.W.1 (VIC 0141), who are specialists.

"Pregnancy Diagnosis by the Xenopus Method," 24-hour service. Send specimens of urine and £2 2s. fee. Hæmatology, Biochemistry, Flame Photometry.—WELBECK BIOLOGICAL LABORATORIES, 26, Park-crescent, Portland-place, W.1 (MUSeum 5386–7).

The proprietors of British Patent No. 712,703 "Improve-ments relating to Surgery," desire to conduct negotiations for the grant of a manufacturing licence with respect to or for the disposal of the above-numbered Patent. Anyone interested should apply.—EDWARD EVANS & Co., Chancery House, 53–64, Chancery-lane, London, W.C.2.

Typewriting and Duplicating. First-class work at moder-ate prices by experienced medical typists. Electric machines. —SYBIL RANG, 21, Heath-street, Hampstead, London, N.W.3 (HAM 5329/0504).

Microscopes. Highest prices paid for good modern types. Send or bring your equipment for valuation.—WALLACE HEATON LTD., 127, New Bond-street, W.1.

Old medical books, pictures, manuscript notebooks, letters, &c., wanted by a collector.–Address, No. 343, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

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Aesculin ..... 10 mg. (1.0%)
Water-miscible vehicle q.s. to 1 Gm.

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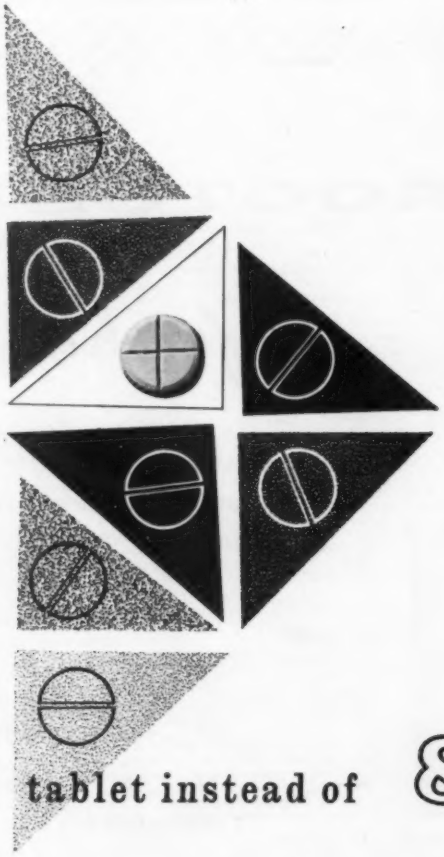

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